U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-277 878

A National Environmental/Energy Workforce Assessment. Utah

National Field Research Center, Inc, Iowa City, Iowa

Prepared for

Environmental Protection Agency, Washington, D C

Dec 77

PB 277 878

A National Environmental/Energy Workforce Assessment

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

Conducted by:

National Field Research Center, Inc.

P.O. Box 287

Iowa City, Iowa 52240

126

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB277878
4. TITLE AND SUBTITLE A NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT, Utah		5. REPORT DATE December 1977 - Date of Completion 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) National Field Research Center, Inc.		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Field Research Center, Inc. P.O. Box 287 Iowa City, Iowa 52240		10. PROGRAM ELEMENT NO. 2BC651 (36) 11. CONTRACT/GRANT NO. Grant #T900591010
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Federal Activities (A-104) 401 M Street, S.W. Washington, D.C. 20460		13. TYPE OF REPORT AND PERIOD COVERED Phase I Final Report 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES Phase II will comprise approximately five volumes and will be available in September 1978. Phase III will be available in September 1979.

16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Planning Regional Planning State Planning State Agencies Federal Government Planning Labor Force Manpower Forecasting	Employment Economic Surveys Energy Management Pollution Control Environmental Management Environmental Education Environmental Sciences Conservation Environment	National Environmental/Energy Workforce Assessment	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release Unlimited		126
	20. SECURITY CLASS (This page)	22. PRICE PC A07 MF A01

220-1 (9-73)

NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

UTAH

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

This document has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

National
Field
Research
Center, Inc.

Box 287 Iowa City, Iowa 52240 (319) 351-8789

INTRODUCTORY NOTE

The National Environmental/Energy Workforce Assessment was conducted by National Field Research Center, Inc. with main offices in Iowa City, Iowa. The following personnel have had primary responsibility for the Assessment and project report.

IOWA CITY, IOWA
- Dr. Darold E. Albright, President
- Paul E. Bridges, Executive Director
- Dr. Richard L. Benesh, Project Director
- Judith J. Gordon
- Alan M. Stowell
- Anita M. Stowell
- Mary Kay (Edge) Wade

ATLANTA, GEORGIA
- Elizabeth G. Nielsen, Regional Director
- Robert Oxberger

DENVER, COLORADO
- Nancy C. Dillenberg, Regional Director

SEATTLE, WASHINGTON
- Steven Silva, Regional Director

WASHINGTON, D.C.
- Frank E. Smith, Project Coordinator
- Lloyd B. Chaisson, Assistant Project Coordinator
- Jack F. Seum

Additional research and clerical assistance was provided by Frederick M. Wall, Maxine Wolfe, Margaret Fehn, Sandra Hogsed, Karen Kirchoff, Sharon Leiker, Marilyn Low, Mary McCormac, and Joan Urquhart.

FIELD OFFICES

ATLANTA
2700 Cumberland Pkwy
Suite 150
Atlanta, GA 30339
(404) 433-2644

DENVER
2600 S. Parker Rd.
Suite 160, No. 6
Denver, CO 80232
(303) 751-4962

SEATTLE
927 United Pacific Bldg.
1000 2nd Ave.
Seattle, WA 98101
(206) 623-9170

WASHINGTON, D.C.
1522 K Street, N.W.
Suite 500
Washington, D.C. 20005
(202) 223-9136

TABLE OF CONTENTS

	Page
ILLUSTRATIONS	iii
ACKNOWLEDGEMENT	vi
PREFACE	vii
FOREWORD	viii
STATE SUMMARY	1
STATE PROFILE	14
POLLUTION CONTROL AND ABATEMENT AGENCIES	15
POLLUTION CONTROL AND ABATEMENT PROGRAMS	24
I. Air	25
II. Noise	38
III. Pesticides	43
IV. Potable Water	53
V. Radiation	62
VI. Solid Waste	68
VII. Wastewater	78
VIII. Energy	89
SELECTED POST SECONDARY INSTITUTIONS WITH FORMAL ENVIRONMENTAL/ENERGY PROGRAMS	99
STATE LEGISLATION	105

NOTE: The Selected Bibliography is appended to each Regional Report.

ILLUSTRATIONS

Figure		Page
1	State of Utah, Department of Social Services	17
2	State of Utah, Department of Social Services, Division of Health, Environmental Health	18
3	State of Utah, Department of Agriculture	21
4	State of Utah, Department of Natural Resources	23
5	Utah State Bureau of Environmental Health, Bureau of Air Quality, Organizational Chart, March, 1977	29
6	Organizational Chart, Bureau of Environmental Health, Bureau of Water Quality, Public Water Supply Program, 1976	55
7	Utah Department of Social Services, Division of Health, Environmental Health Services Branch - Bureau of Water Quality, Organizational Chart	56
8	Organizational Chart, Bureau of Environmental Health, Bureau of Water Quality, Water Pollution Control Program, 1976	79
9	Fuels Related Projects	90

Table		Page
I	Utah Division of Health, Environmental Health Services, Air Quality Bureau, Current (1976) Staffing Level	28
II	Utah Division of Health, Environmental Health Services, Air Ouality Bureau, Workforce Projections to 1982 (est.)	33
III	Utah Department of Social Services, Division of Health, Environmental Health Section, Bureau of Radiological & Occupational Health, Noise Program, Current (1976) Staffing Level	38

Table		Page
IV	State of Utah, Municipal Noise Ordinances, (1976)	39
V	Utah Department of Social Services, Division of Health, Environmental Health Section, Bureau of Radiological & Occupational Health, Noise Program, Workforce Projections to 1982 (est.)	41
VI	Utah State Department of Agriculture, Division of Plant Industry, Current (1976) Staffing Level	44
VII	State of Utah, Pesticides Personnel, Current (1976) Staffing Level (estimated)	46
VIII	Utah Pesticides Personnel, Workforce Projections to 1982 (est.)	47
IX	State of Utah, Training Programs - FY 1976 -	49
X	Utah Department of Social Services, Division of Health, Bureau of Water Quality, Water Supply Section, Current (1976) Staffing Level	54
XI	Utah Department of Social Services, Division of Health, Bureau of Water Quality, Water Supply Section, Workforce Projections to 1982 (est.)	58
XII	Utah Department of Social Services, Division of Health, Bureau of Water Quality, Water Supply Section, Educational Activities - 1976 - (partial listing)	59
XIII	Utah Department of Social Services, Division of Health, Environmental Health Section, Bureau of Radiological & Occupational Health, Radiation Program Current (1976) Staffing Level	63
XIV	State of Utah, Radiation Personnel, Current (1976) Workforce Level (estimated)	64
XV	Utah Department of Social Services, Division of Health, Environmental Health Section, Bureau of Radiological & Occupational Health, Radiation Program, Workforce Projections to 1982 (est.)	65

Table		Page
XVI	State of Utah, Radiation Control, Available Training (1976)	66
XVII	State of Utah, Solid Waste Management Personnel, Current (1976) Staffing Level	72
XVIII	State of Utah, Training Program Fy 1976 - FY 1977	74
XIX	Utah Department of Social Services, Division of Health, Environmental Health Services Branch, Bureau of Water Quality, Water Pollution Control Staff, Current (1976) Staffing Level	81
XX	Utah Department of Social Services, Division of Health, Environmental Health Services Branch, Bureau of Water Quality, Water Pollution Control Staff, Workforce Projections to 1982 (est.)	82
XXI	Utah Department of Social Services, Division of Health, Environmental Health Services Branch, Bureau of Water Quality, Water Pollution Control Staff, Workforce Projections to 1982 (est.)	83
XXII	State of Utah, Waste Water Training (1976)	85
XXIII	Utah Department of Natural Resources, Division of Oil & Gas Conservation, Current (1976) Staffing Level	91
XXIV	Utah State Planning Office, Current (1976) Staffing Level	92
XXV	Utah Department of Natural Resources, Division of Oil & Gas Conservation, Workforce Projections to 1982 (est.)	94
XXVI	Utah Interdepartmental Coordinating Council for Energy Affairs, Workforce Projections to 1982 (est.)	95

ACKNOWLEDGEMENT

This report was researched and developed under the guidance of the U.S. Environmental Protection Agency Region VIII. The State of Utah materials were developed under the auspices of the following:

Mr. Elmer Chenault
Regional Manpower Officer
U.S. Environmental Protection Agency
Region VIII

Mr. Lynn M. Thatcher
Deputy Director of Health for
Environmental Programs
Utah State Division of Health

Technical assistance and cooperation were extended by numerous individuals: Mr. Brent Bradford, Mr. Dennis Dalley, Mr. Richard Hansen, Mr. Howard Hurst, Mr. Stephen Moehlmann, Mr. Dale Parker, Mr. Jay Pitkin, Mr. Marvin Reid, Mr. Alvin Rickers, Mr. Calvin Sudweeks, and Dr. Grant Winn of the Utah Bureau of Environmental Health; Mr. Ray Downs and Mr. John Knighton, Utah Department of Agriculture; Mr. Scott Flandro, Utah Department of Natural Resources; Mr. Cleon Feight, Utah Oil and Gas Conservation Board; Mr. Ta Li, Society of Mining Engineers; Mr. Charles Denton Federal Energy Administration; Professors Norman Jones and Joseph Middlebrooks, Utah State University; and Mr. William Quigley, Attorney General's office.

To those associated agencies and offices who assisted in the research and development of this report, the authors extend their sincere thanks.

PREFACE

The research and development of the NATIONAL ENVIRONMENTAL/ ENERGY WORKFORCE ASSESSMENT project was conducted under the aegis of the U. S. Environmental Protection Agency by the National Field Research Center, Inc., Iowa City, Iowa, and the Denver Regional Office. This report is a summary of the State of Utah and is one of six state reports within Federal Region VIII.

The State of Utah Report presents an overview of the current workforce, projections of workforce requirements (1976-1981), training and certification, and career potential in environmental pollution control and abatement. The environmental areas depicted within this report are: air, noise, potable water, pesticides, solid waste, waste water, radiation, and energy conservation/conversion.

FOREWORD

This state report is a summary of Phase I of the NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT project in Utah. The information contained within this report was obtained by extensive on-site interviews and research of project related materials. The information retrieval was conducted through representative federal, state, and when time allowed, local agencies. Telephone and written surveys were utilized as a secondary research source.

Data which is not documented herein is representative of the best professional judgements of experts currently working in the field.

This study is designed specifically for use as a reference tool at the federal regional level as well as at the state level. It is anticipated that the people of the State of Utah will be the beneficiaries of this endeavor.

National Environmental Energy Workforce Assessment

Phase I

UTAH

State Summary

I. AIR

The State of Utah had no air pollution control laws until May, 1967. Public concern for air quality, however, dates to 1906. By 1920, Salt Lake City was the smelter capital of the world and air quality was deteriorating. Air quality has significantly improved, however, through the implementation of more stringent state and federal legislation.

Legal authority has been established for the Air Conservation Committee (ACC) to adopt standards and regulations and to establish enforcement procedures. The ACC is established within the State Division of Health which has the responsibility of administering the Air Conservation Program, through the Air Quality Bureau. The Air Quality Bureau is composed of 21 professionals, while statewide air personnel are estimated to number approximately 100. Across the state, estimates have been proposed for a 6% per annum growth over the next three to five years.

Emphasis within the Bureau is away from monitoring and data collection and toward enforcement and planning. Air quality specialists and public health engineers have the greatest career potential within the Bureau.

In the private sector, implementation of new technology to achieve compliance standards will enhance the career potential of highly trained engineers, industrial design specialists, chemists and air quality technicians.

II. NOISE

Currently in Utah there is no state noise restriction. However, with the exception of Colorado, the State of Utah has the most active noise pollution control and abatement program in the Rocky Mountain Prairie Federal Region VIII at the municipal level.

The Department of Social Services, Division of Health, Environmental Health Section has been designated as the lead agency. Current staffing levels include four personnel assigned to the Bureau of Radiological and Occupational Health and approximately 50 professionals statewide. Some of these personnel, however, are involved in other areas of responsibility; for example, law enforcement. Workforce profiles should experience an approximate 6% per annum increase over the next three to five years in Utah.

Increased regulation and control of noise emission will require development of special training programs, at the technical level in order to supplement the activities of the more highly trained specialists. Such careers may be termed environmental technicians. There will be a continuing need for university trained scientists and researchers but to a limited degree in the state. Salary levels in the private sector will be higher than at the state or local level.

Noise control will remain somewhat restricted in terms of workforce for the next three to five years.

III. PESTICIDES

The Division of Plant Industry of the State Department of Agriculture, administers programs which pertain to plants and plant products. Programs included are: cooperative pest control, enforcement of plant quarantines, and supervision of the testing and licensing of private commercial pesticides applicators.

The workforce includes 26 state level personnel and 7,000 private applicators as well as 526 commercial and non-commercial applicators. Over the next three to five years, no increases or decreases are anticipated in the numbers of state personnel. Applicators in all categories should experience an approximate one percent per annum growth rate.

Career opportunities in the area of pesticides in Utah will be limited due to minimal increases in personnel which have been forecast. Degreed level personnel will be needed in research and in administrative capacities. The less than degreed career options will represent the most numerous occupational opportunities.

Training and certification of private and commercial applicators has accelerated. Utah's program has been well received within the agricultural community. Thus far, approximately 400 commercial applicators and 2,300 private applicators have been certified.

IV. WATER

Utah is water poor, the second driest state in the nation. On the other hand, Utah is an energy rich state. Not only will energy resource development affect water quality but it is, to a large degree, contingent upon availability of water. The two critical water issues in the state are quality and quantity, therefore.

Primary responsibility for potable water has been allocated to the Utah State Division of Health, Bureau of Water Quality, Water Supply Section. Staffing levels for the Bureau include 10 water supply personnel. There are approximately 1,000 water personnel across the state. Statewide the workforce is anticipated to experience an approximate 14% per annum growth rate to 1982. This is predicated on the fact that Utah has indicated intentions of assuming primary enforcement responsibility for the Safe Drinking Water Act. However, should the state not assume "primacy" the workforce projections would be decreased by approximately 50%.

Career opportunities will be available on the operator level in all classifications. Specific staffing increases will depend on the degree to which legislative mandates can be met. Funding levels, e.g., will be a determinant in meeting established regulatory guidelines. Positions at the state level will include engineers, biologists, computer specialists and hydrologists.

V. RADIATION

Problems related to radiation and radioactivity are not as serious in Utah as in some other states. Utah does have uranium mining and milling and tailings are a source of concern. Utah citizens are also concerned that the state's salt dunes will become sites for radioactive waste disposal.

The primary responsibility for radiation control in the state has been allocated to the Utah Department of Social Services, Division of Health, Environmental Health Section, Bureau of Radiological and Occupational Health. The workforce includes less than 100 persons statewide. A one percent per annum growth rate is projected for Utah radiation control personnel to 1982. State level personnel will experience a growth rate in excess of one percent due specifically to an expressed need for health physicists. Radiation control expansion will be kept to a minimum, however, relative to the workforce. The private sector will be responsible for the majority of the workforce increases, numerically, in Utah. The salaries will be higher and the turnover maintained at its current low level. The development of power plants in the state will affect the workforce profile in the near future.

Limited career opportunities will be available especially at the degreed level. Should Utah become an "agreement" state, job opportunities at the state level would increase somewhat. Nuclear expertise would be more in demand.

VI. SOLID WASTE

With the exception of one incinerator site, solid waste in Utah is disposed of at landfill sites. The Utah Bureau of Solid Waste Management, the Environmental Health Services Branch estimates that approximately 85% of these sites are not in total compliance.

The Bureau of Solid Waste Management includes three professional personnel, while the statewide workforce includes less than 300. Increases in this workforce are forecast to 1982. These increases, however, will most likely not exceed two to three percent per annum.

More emphasis will be given to enforcement and hazardous waste problems, but career potential is still limited to the standard positions. Statewide these may include landfill operator, heavy equipment operators and collectors. This may change as resource recovery sites and established hazardous waste sites are developed. Trained engineers, geologists, and hydrologists will be instrumental in the planning, development and operation of these sites. Integrated planning between state, local, and private sectors will be needed to select proper sites and to coordinate their operation. Proper site selection for wastes generated by the mining and oil industry, is an immediate priority. Five hazardous waste disposal sites, properly planned and executed, would adequately handle hazardous waste disposal in Utah.

VII. WASTE WATER

Utah's Water Pollution Control Act was passed in 1953 as the result of an intensive campaign to inform the public of the need for effective water pollution control. The Utah Division of Health, Environmental Health Services Branch, Bureau of Water Quality is the lead agency. Raw sewage discharges and overloaded treatment plants are problems which have been identified in the state.

Workforce projections for state personnel are dependent upon whether Utah assumes responsibility for certain federal programs, for example, construction grants, over the next five years. Increases in state level staffing will occur at a per annum rate of between six percent and nine percent. Increases in operators is anticipated not to exceed five percent per annum to 1982.

Career opportunities for employment within the Bureau of Water Quality will remain the greatest for public health engineers during the next five years. In the private sector, engineers employed by consulting firms will be in demand. The Bureau of Water Quality will be subcontracting more work in the next five years, and engineers are the primary recipients.

The career potential for wastewater operators appears to be limited, at least until 1980. With additional federal funding, career potentials for operators will improve.

VIII. ENERGY

Utah has an abundant supply of energy resources which include oil shale, uranium, geothermal and high quality, low sulphur bituminous coal. A multitude of energy related projects are scheduled for the state including uranium mines and gasification plants. As in many western states, future extraction and conversion activities will be an integral component of Utah's future.

There are several agencies to which responsibilities and activities have been delegated regarding energy and pollution control and abatement. These include the Department of Natural Resources, State Planning Office and the Interdepartmental Coordinating Council for Energy Affairs.

Because Utah is an energy resource state and developmental activities impact several aspects of state and local government, the workforce involved in pollution control and abatement activities at all levels will illustrate percentage per annum increases. These increases should be approximately four percent per annum. Although no firm figures are available, the private sector should experience a five to eight percent per annum increase.

Career opportunities are expected to develop over the next three to five years for degreed and highly trained engineers, scientists, and architects in energy research, product design and development, as well as in the extractive industries. Career opportunities will be available on the technical level.

STATE OF UTAH - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	104	110	117	124	131	139	6%
NOISE[1]	54	57	61	65	68	71	6%
PESTICIDES[2]	7,552	7,558	7,564	7,571	7,577	7,584	N/A
POTABLE WATER[3]	510	514	568	625	927	928	14%
RADIATION	96	98	101	103	106	108	2%
SOLID WASTE	277	283	289	295	301	307	2%
WASTEWATER	519	540	562	584	607	631	4%
ENERGY[4]	64	67	70	74	78	82	5%
TOTALS	9,176	9,227	9,332	9,441	9,795	9,850	2%

[1] Includes some part-time personnel.

[2] Includes no growth for state personnel and no growth for private applicators.

[3] Predicated on assumption of primacy.

[4] Does not include private sector.

EDUCATION

In 1890, the Utah State University, then called the Utah Agricultural College, opened its doors in Logan. Today, Utah State University (USU) has an approximate enrollment of 9,000 students. The University consists of 46 departments in eight academic colleges and a school of graduate studies. The majority of the environmental/energy programs currently being conducted in Utah are located at Utah State University at Logan.

The College of Engineering presently includes a program in civil and environmental engineering which leads to a Bachelor's of Science degree. The environmental engineering curriculum is interdepartmental and is basically a graduate program which offers the degrees of M.S. and Ph.D.

The USU College of Natural Resources administers an environmental studies program which leads to a B.S. degree. This program utilizes resources from across the university and is a broad based curriculum with a considerable degree of flexibility.

The USU College of Science, Department of Biology offers a B.S. degree in Public Health with an environmental health option. A B.S. degree in Applied Biology is available with the program emphasis on pest management.

In addition, USU has established the Utah Water Research Laboratory. Research is conducted which includes all areas of water resources, water quality and weather modification.

LEGISLATION

The environmental/energy legislation for Utah was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Conservation Act

Economic Poison Application Act of 1951

Insecticide, Fungicide and Rodenticide Act of 1951

Radiation Protection Act

Junkyard Control Act

Water Pollution Control Act

National Environmental Energy Workforce Assessment

Phase I

UTAH

State Report

STATE PROFILE

The "Beehive State" is 84,916 square miles in the shape of a rectangle. Utah is divided into two geographical areas. The Uinta Mountain range is the only major chain in the United States to run east to west. Distinctive to Utah is the Great Salt Lake and the Great Salt Lake Desert. Buffalo, inhabitants of an island of the Salt Lake, as well as cougar, lion, and bear share this land in a delicate balance with 4,000 species of plants. The Great Salt Lake islands also provide 50,000 acres of bird sanctuary area for over 160 species.

The population of 1,059,273 people inhabit this state with three major cities: Salt Lake City, Ogden, and Provo. The population density is 12.9 per square mile. Indian tribes contribute to this population with the largest reservation being the Navajo, stretching across parts of Arizona and New Mexico.

Agriculture, mining, and forestry are major contributors to the economic base. 13,200,000 acres are currently under agricultural production. Mining activities include petroleum and coal. The Bingham Canyon Copper Mine is the largest open-pit copper mine in the world. Utah also ranks second in national production of gold and third in uranium production.

In Utah, the beehive is seen extensively throughout the state, and is recognized as a symbol of the industriousness of the people.

POLLUTION CONTROL AND ABATEMENT AGENCIES

The following agencies are those which are involved with environmental programs within the state. Each narrative provides a review of the functions and activities of each agency as they relate to environmental programs.

UTAH DEPARTMENT OF SOCIAL SERVICES

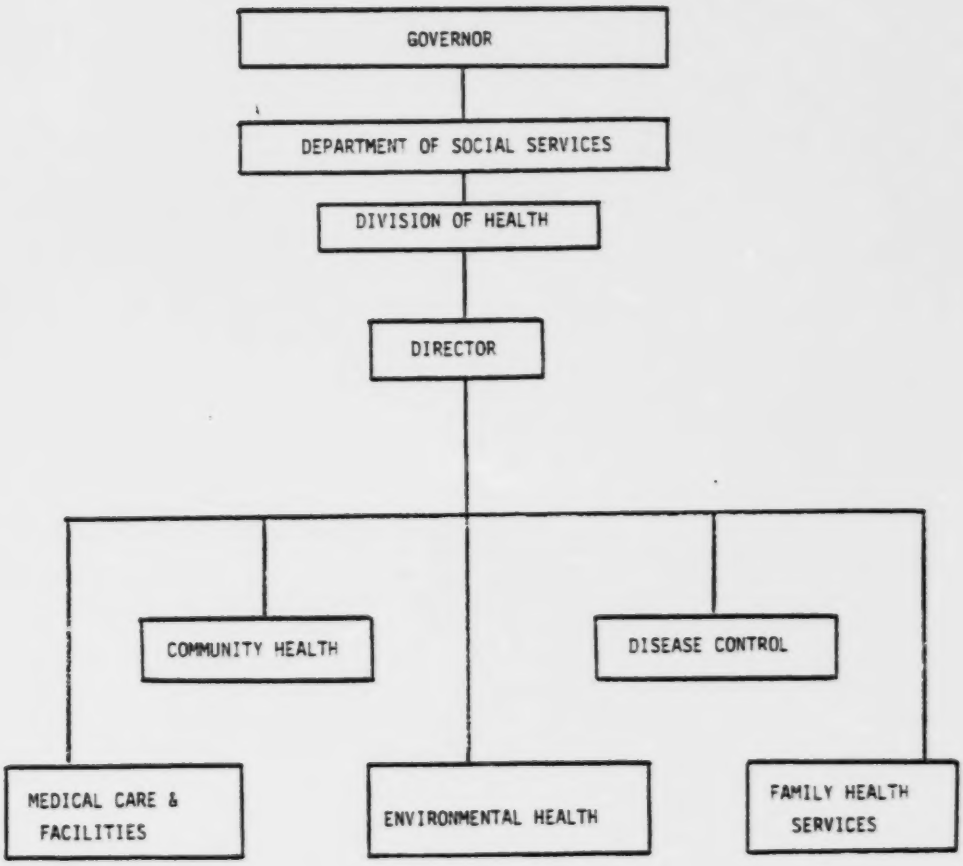
The Utah Department of Social Services was established as a result of the consolidation of several state agencies during the mid 1960s. Agencies such as Welfare, Corrections, Mental Health, Public Health, Drugs and Alcohol and Indian Affairs were realigned under the new Department of Social Services.

The Department of Social Services is composed of several divisions, one of which is the Division of Health. This Division has five major components: Community Health; Medical Care & Facilities; Environmental Health; Disease Control; and, Family Health Services. The Environmental Health Section of the Division of Health has been allocated the major responsibilities for environmental pollution control and abatement in the areas of waste water, potable water, radiation, noise, solid waste and air. All industrial and municipal pollution control and abatement programs in these areas are administered by the Environmental Health Section bureaus in order to ensure compliance with state and federal regulations.

STATE OF UTAH

DEPARTMENT OF SOCIAL SERVICES

Figure 1



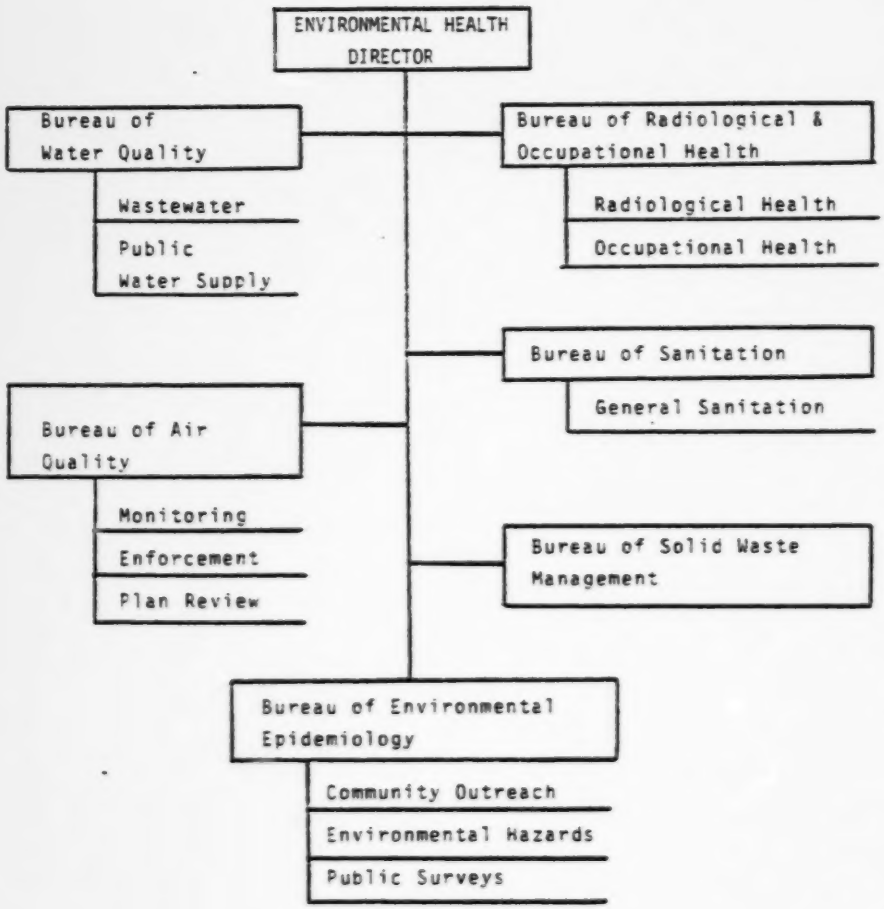
STATE OF UTAH

DEPARTMENT OF SOCIAL SERVICES

DIVISION OF HEALTH

- ENVIRONMENTAL HEALTH -

Figure 2



UTAH STATE DEPARTMENT OF AGRICULTURE

In 1969, the Utah state legislature passed the Agricultural Reorganization Act. This Act allocated the administrative authority of the Department of Agriculture to an executive office, the Commissioner of Agriculture, with an advisory board. The Governor of the state appoints the Commissioner, and the advisory board. The advisory board is composed of representatives of farm organizations, agribusinesses, agricultural science and, consumer affairs. The major responsibilities of the Board are to advise the Commissioner of Agriculture regarding planning and implementation of programs and the administration of laws assigned to the Department.

The Utah State Department of Agriculture was established by the legislature in 1921 and is one of the oldest agencies within the state government structure. The establishment of the Department in 1921 was the result of redefinition of the State Board of Horticulture which had been created in 1896.

Today the Department of Agriculture is composed of six divisions whose history is traced to the period 1896 to 1921 when six separate state agencies administered the agricultural and consumer laws. Having evolved from the early state agencies the divisions are presently enumerated as follows:

- Administrative Services;
- Agricultural Laboratories;
- Agricultural Development;
- Animal Industry;

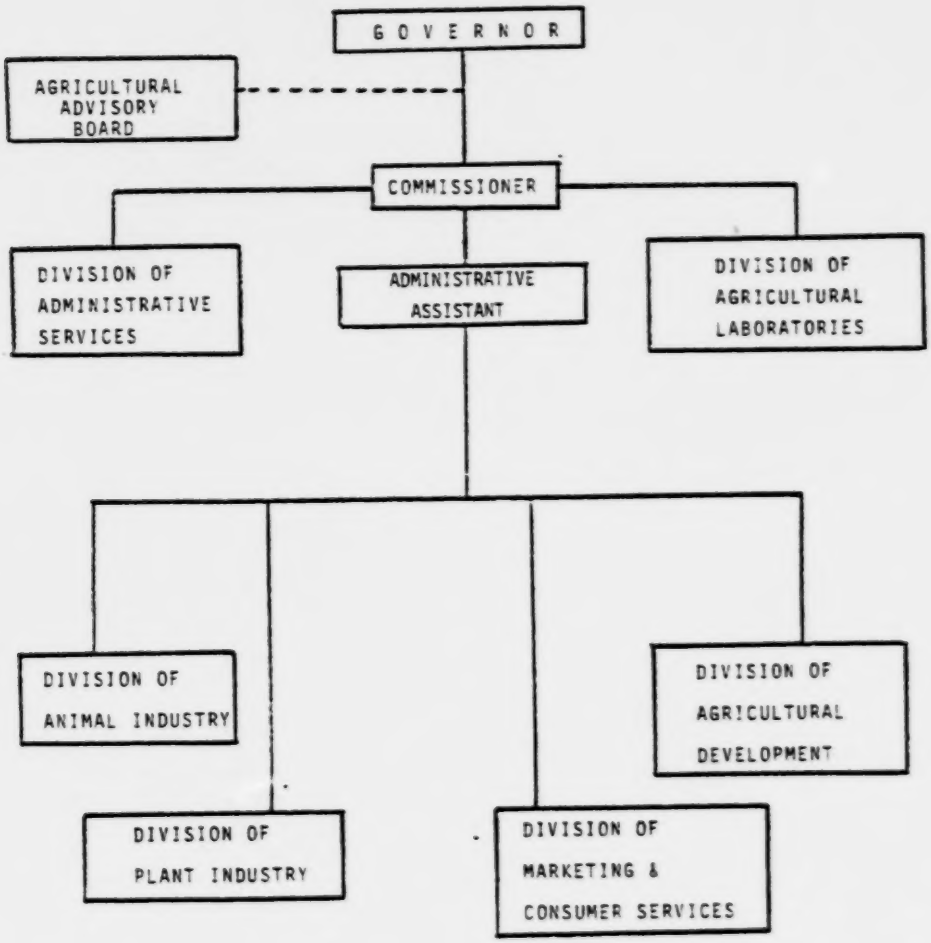
- Marketing and Consumer Services; and,
- Plant Industry.

The current budget for the Department is $3.2 million of which 65% is allocated to producer and consumer protection services. The Department staff is approximately 180 employees.

STATE OF UTAH

DEPARTMENT OF AGRICULTURE

Figure 3



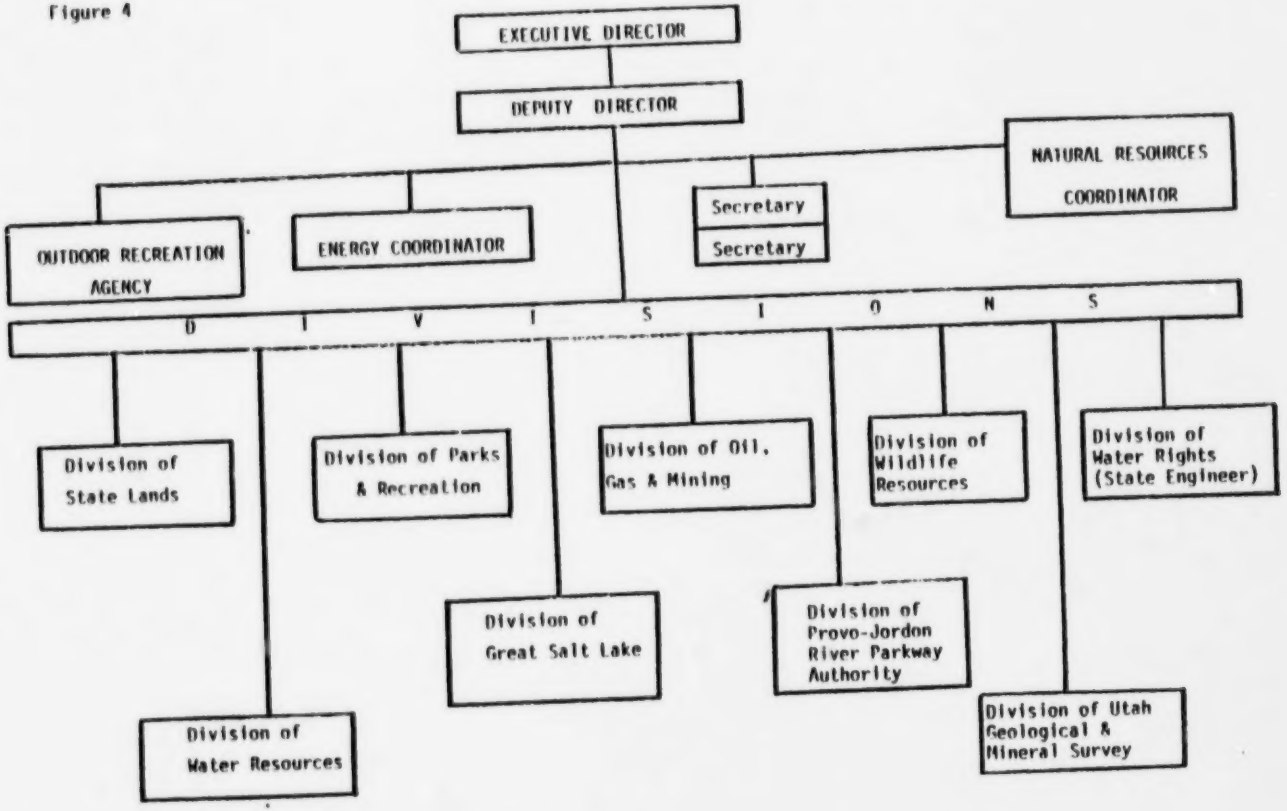
UTAH DEPARTMENT OF NATURAL RESOURCES

The Utah Department of Natural Resources was created on July 1, 1967 and presently is composed of approximately 750 employees with an Executive Director appointed by the Governor.

This Department is composed of one agency, Outdoor Recreation; and, nine divisions: State Lands; Parks and Recreation; Oil, Gas, and Mining; Water Resources; Great Sale Lake; Provo-Jordon River Parkway; Geological and Mineral Survey; Wildlife Resources; and, Water Rights (State Engineer).

STATE OF UTAH - DEPARTMENT OF NATURAL RESOURCES

Figure 4


EXECUTIVE DIRECTOR
DEPUTY DIRECTOR
NATURAL RESOURCES COORDINATOR
OUTDOOR RECREATION AGENCY
ENERGY COORDINATOR
Secretary
Secretary
D I V I S I O N S
Division of State Lands
Division of Parks & Recreation
Division of Oil, Gas & Mining
Division of Wildlife Resources
Division of Water Rights (State Engineer)
Division of Water Resources
Division of Great Salt Lake
Division of Provo-Jordon River Parkway Authority
Division of Utah Geological & Mineral Survey

Pollution Control and Abatement Programs

I. AIR

A. Introduction

The State of Utah had no air pollution control laws until May of 1967. Public concern for air quality, however, dates to 1906 when a federal court enjoined 32 smelters (including the world's largest) in the Valley of the Wasatch Mountain Range to reduce sulfur dioxide and arsenic emissions.

By 1920, Salt Lake City was the smelter capital of the world and air quality was deteriorating. From 1941 to 1945 Salt Lake City endured its worst era of air pollution. Reports of this period describe averages of 900 hours per year in which visibility was less than three miles.

Utah air quality has significantly improved through the implementation of more stringent state and federal legislation. Since the Clean Air Act of 1970 was passed, carbon monoxide levels have declined perceptively. In 1971, carbon monoxide levels exceeded the ambient air standards 327 times; but by 1975, the standards were exceeded only 188 times.

Utah's air pollution problems are compounded by the Wasatch Front topography and climate. (Utah Valley, Salt Lake Valley, and the valley north from Salt Lake City to Brigham City)

In the evening along the Wasatch Front, cold air from the mountain tops rolls down into the valleys. These air currents lift warm air from the floor of the valleys to a higher elevation, which traps aerial pollutants which have been generated at ground level. This condition, known as temperature inversion, is most severe during the fall and winter months and is analogous to the Los Angeles type smog caused when sunlight acts

as a catalyst to initiate a photochemical reaction with hydrocarbons which are emitted primarily by automobiles.

The federal Clean Air Act of 1970 required preparation of State Implementation Plans (SIP), and granted the U.S. Environmental Protection Agency (EPA) approval authority.

In July 1976, the EPA Region VIII Administrator rejected the Utah SIP and asked the state to submit a revised proposal. Accordingly, a new plant anticipating particulate emission must have both state and EPA review approval.

As Utah exceeds both primary and secondary standards for particulate matter, the state now requires industry to utilize the best abatement control system. Therefore, electrostatic precipatators which removes fly ash, will be required to have an efficiency level of 99.5% as opposed to a 98% level, which would have been allowed prior to the new regulations. The state is attempting to meet primary standards within the next three to three and one-half years and secondary standards within the next five years.

A main priority is the revision of the SIP for particulate matter so that the state may reassume delegation of authority from the EPA. Another priority is the redivision of the state into the three air quality control classifications in order to prevent significant deterioration. Utah is attempting to achieve EPA's Western Quality Control standards and the date stipulated is July 21, 1977.

Regarding levels of sulfur dioxide, Utah has made significant progress in recent years. This is due, in part, to corrective measures taken by

Kennecott Copper Corporation (KCC) smelter, the only major source of Sulphur Dioxide in Utah. Kennecott currently operates under variances, as do six other companies in Salt Lake County, allowing excess pollutants and must meet compliance schedules by July 31, 1977 in order to conform to standards. Kennecott is taking corrective measures and the implementation of new technology is estimated to cost 300 million dollars. With nearly 7,500 employees in 1974, earning wages of almost $100 million and indirectly supporting another 23,700 people earning $200 million in wages, KCC is a most significant industry accounting for 3.5% of the personal income in Salt Lake County. Accusations of leniency have been made by some of the smaller industries.

B. Workforce Profile

The Utah Air Conservation Act of 1967 established the legal authority for the Air Conservation Committee (ACC) to adopt standards and regulations as well as to establish enforcement procedures. ACC's authority is broad and has been upheld by the Utah Supreme Court. ACC members are appointed by the Governor for a term of four years. The 1967 law, amended in 1971, increased the membership by two persons. Today, the ACC is composed of the following: Director of the State Division of Health; a practicing physician licensed in Utah, not aligned with industry; a registered engineer not from the industrial sector; representatives of municipal or county government, manufacturing, agriculture, and mining and fuel industries; and, three representatives of the general public knowledgeable in air pollution matters but not associated with industry. No more than

five members may be affliated with the same political party. The Executive Secretary is also the Director of the Air Quality Bureau, Environmental Health Services, State Division of Health. The ACC is established within the State Division of Health which has the responsibility of administering the Air Conservation Program. The Air Quality Bureau provides the ACC with data and analyses. An organizational chart appears on the following page.

The Air Quality Bureau is composed of 21 professional staff members which include meteorologists, chemists, civil and mechanical engineers, a bacteriologist, a physicist, a zoologist and two electronics technicians. The following table depicts the Air Quality staff.

TABLE I

UTAH DIVISION OF HEALTH

Environmental Health Services
Air Quality Bureau
Current (1976) Staffing Level

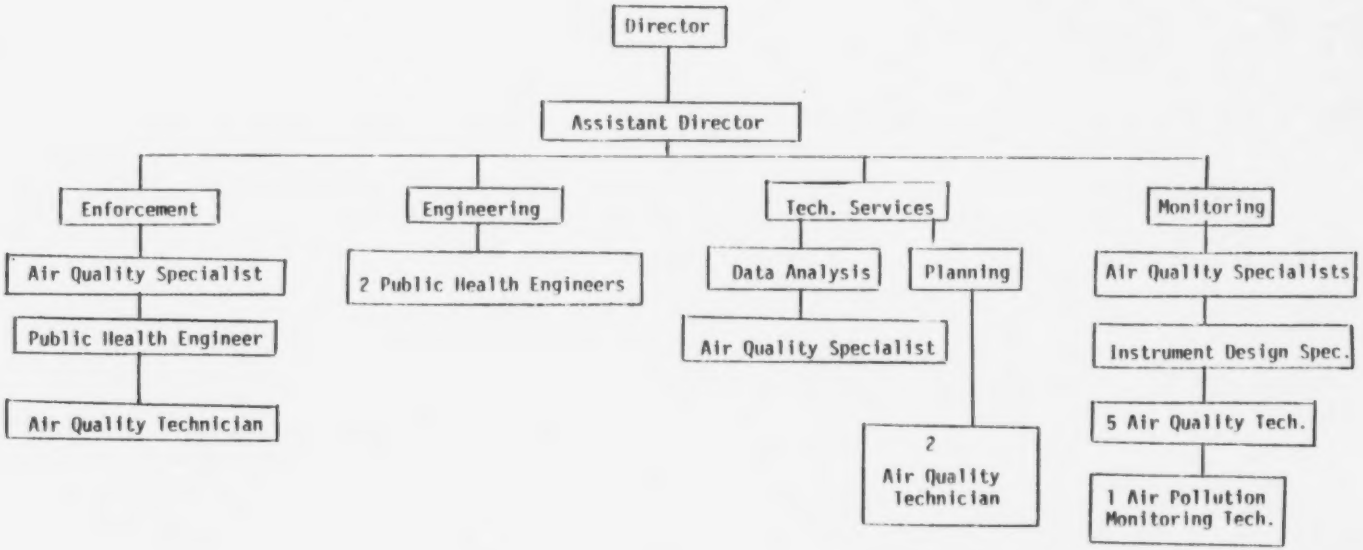
Position	1976	%/annum turnover (average)
Administrator	2	0%
Air Quality Specialist	6	5%
Public Health Engineer	3	0%
Air Quality Technician	8	0%
Instrument Design Specialist	1	0%
Air Pollution Monitoring Specialist	1	0%
TOTAL	21	1%

The goal of the Utah Air Quality Bureau, as stated in the "Program Goals for FY 1976," is to adequately control the release of air contaminants to the atomosphere in order to prevent injury to man, animals and vegetation, and to maintain degradation of property and aesthetics at a minimum.

Figure 5

UTAH STATE BUREAU OF ENVIRONMENTAL HEALTH

Bureau of Air Quality
Organizational Chart
March 1977



Support program activities or services include: the variance program; review of plans and specifications; update emission inventories; maintain and expand monitoring systems; interpret and record monitoring results; train personnel in monitoring operations; train personnel in visible emissions evaluations; update information for technology changes; inspect sources to determine compliance with the law; special reports to aid in determining control problems; inform public and groups of air pollution problems and control; and evaluate progress of air pollution control strategies listed in the State Implementation Plan.

Under contract to the Bureau but not officially listed as Bureau personnel are: one chemist; one part-time attorney from the Attorney General's Office; and, one part-time engineer from a consulting firm.

A statewide air monitoring system is maintained which operates continuously. Eighteen part-time operators are involved in the operation of these sites and eleven Air Quality technicians from the Division collect data. The state has been divided into three Air Quality Control Regions, and a four-phase monitoring system has been developed.

The three Air Quality Control Regions are: the Wasatch Front Intrastate Area Quality Control Region; the Utah Intrastate Area Quality Control Region; and, the Four Corners Interstate Air Quality Region. The four-phase state/federal cooperative air monitoring system consists of:

- A network of six primary stations located in the Wasatch Front Air Quality Control Region. These stations consist of several units each measuring levels of individual pollutants.
- An effects sampling network where amounts of individual pollutants are measured by their effects on various types of materials. This is not a precise measurement but only indicative of relative levels.

- A network which measures levels of air-borne beryllium.
- A network of radioactive fallout stations which evaluate gamma-beta radiation in the air.

Four counties in Utah employ eight technicians that do part-time work on monitoring and visible emissions in addition to surveillance work on open burning.

Another air pollution control and abatement program, which in the years to come will affect the greatest number of people, is the Transportation Control Plan. This plan is essential to Utah's SIP and it includes the Wasatch Front counties where carbon monoxide standards are regularly violated. This plan calls for the reduction of vehicle miles driven in the business section through traffic control. Increased parking meter fees and reduced meter periods will encourage long term parkers to use city lots rather than looking for a vacant spot. An improved mass transit program was approved by Salt Lake City voters in 1974 and increased bus use has reduced carbon monoxide emission levels. The further reduction of pollutants per vehicle will be accomplished through the Federal Motor Vehicle Control Program which should reduce carbon monoxide levels in Salt Lake City by an estimated 42%. EPA Region VIII has already instituted a training workshop at Colorado State University to instruct mechanics (who will in turn instruct other mechanics when they return to Utah) on automotive technology for inspection and control for carbon monoxide emissions (calibration checks).

The state has authority to require that pollution control devices be maintained and checked. The ACC is planning to require an emissions inspection along with the safety inspection required each year.

Senate Bill 264 is presently under consideration by the Utah legislature to allow private shops to charge a $5 fine for the testing of emission standards. The Air Quality Bureau asserts that a quality assurance provision will be maintained in this program to check for erroneous emission checks by mechanics and misfunctioning equipment.

Information concerning the air pollution control and abatement workforce in the private sector was gathered from the Air Quality Bureau and selected sources from private industry. Information was obtained from on-site and telephone interviews. Data noted below represents the best professional judgement of sources interviewed.

Sources interviewed indicated that there may be 75 to 100 professional and technical personnel involved in air pollution control and abatement in the private sector, the majority employed by Kennecott Copper Corporation, Geneva Steel, Stouffer Chemical, Utah Power and Light, U.S. Steel and Pacific State Cast Iron Company. This workforce is composed of scientists, engineers (civil, mechanical and chemical), chemists, meteorologists, industrial hygientists, instrument specialists (in-plant and out-plant monitoring), maintenance personnel and attorneys.

Industry may hire university students, specialized in a particular field,on a summer intership basis to give them practical experience. These students are rehired once their degree is obtained. Knowledge of the firm is developed and industry often prefers to transfer in-house rather than acquire new personnel. For this reason, the turnover rate for highly technical people is comparatively low in the public sector and salaries reflect this arrangement.

C. Workforce Projections

Projections regarding state and industry personnel are based on the best professional judgements of persons in the Air Quality Bureau and Industry.

If the bureau were to receive budget increases next year, they would add an engineer to review design plans for emission sources and increase the enforcement staff. Staffing projections for the next five years for the Air Quality Bureau are shown below.

TABLE II

UTAH DIVISION OF HEALTH

Environmental Health Services
Air Quality Bureau
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Administrator	2	2	2	2	2	2	0%	0%
Air Quality Specialist	6	6	7	8	9	10	5%	11%
Public Health Engineer	3	3	4	5	6	6	0%	16%
Air Quality Technician	7	8	8	9	9	9	0%	5%
Instrument Design Specialist	1	1	1	1	1	1	0%	0%
Air Pollution Monitoring Specialist	1	1	1	1	1	1	0%	0%
TOTAL	20	21	23	26	28	29	N/A	10%

This table indicates that the greatest growth accrued will be with the public health engineers which reflects the bureau's intention to place

greater emphasis on enforcement. The 40% growth over the next five years in Air Quality specialists also indicates that the bureau will be placing, as a higher priority, their technical services division. In order to keep pace with the priority of more enforcement during the next five years, more air quality technicians will be needed in the monitoring division and this is reflected in the 5% per annum growth figure.

Personnel have a preference for staying within the state which is attributed to a low tax base and Utah's natural aesthetic beauty. Therefore, the turnover in the bureau is almost zero. The only turnover last year was one technician.

The private sector is expected to experience a 5% to 10% growth per year predominately in the professional categories although an increase of technicians will be needed to carry out the increased monitoring of both in-plant and out-plant emissions.

In February 1977, the ACC instructed the Air Quality Bureau to make regulations which would allow industries in those non-deterioration areas who emit less than .14 tons of particulate matter per day to continue but only under the best available control technology (BACT). Any industry that exceeds this established limit will not be allowed to continue on the Wasatch Front.

Implementation of new technology will neccessitate the hiring of more engineers, air quality technicians, industrial design specialists and industrial hygienists; however, specific numbers for projected growth are not available. Sources in the field also comment that smaller industries often hire consulting firms rather than increase their own environmental staff.

D. Training and Certification

The Air Quality Bureau's most concentrated effort in training is placed on their Visible Emissions Evaluation Course which is conducted over a three day period and is given five times a year. Those who are trained come from the Air Quality Bureau's own staff, industry and interested members of the general public. Recent publicity about Utah's air problems, especially with regard to particulate matter and sulphur dioxide has heightened the public concern a[illegible] members of the general public are becoming more numerous.

These courses give an overview of the Air Quality Bureau's program and the state regulations, methods of enforcement and evaluation of air quality. This is the only formal program conducted by the state and it is considered highly successful. Approximately 200 people were trained last year. Certification is given upon completion of the course. Air Quality staff must be recertified every six months; all others require annual recertification. The Bureau strives to have every staff member certified and are most pleased to see the public and industry become involved. Staff members of the Air Quality Bureau will, on rare occasions, attend an EPA course, although budget constraints and the required EPA user fee limit attendance. The bureau indicates that they would participate in more EPA courses if the user's fee was abolished and if instruction was provided for short-term technical courses. Preference was voiced for self-instructional courses.

On-job-training and in-house training are conducted on an informal basis where technical expertise of equipment is taught to a new staff member. Last August, the bureau conducted a two-day stack sampling seminar

for ten of the staff employees. Techniques of stack sampling were taught and instruction was given on how to ensure that industry is following proper procedures.

The Bureau has identified three needs for training in the upcoming years:

- Technical training or equipment; a trouble shooting course on instrument maintenance and repair.
- Resource Management Training; the Bureau has recently switched over to a Management by Objective program and many personnel are unfamiliar with this kind of approach and require training to further their administrative capabilities.
- Quality Assurance training; update of the SIP and EPA requisites mandate training to upgrade quality assurance techniques of the Bureau.

The Bureau comments that presently they have neither the staff nor budget to adequately accomplish these training goals. The Department of Social Services has recently set up a training bureau and this should improve the frequency and quality of training in the Air Quality Bureau.

E. Career Potential

Emphasis within the Bureau is away from monitoring and data collection and towards enforcement and planning. Therefore, air quality specialists and public health engineers have the greatest career potential within the Bureau.

In the private sector, implementation of new technology to achieve compliance standards will enhance the career potential of highly trained engineers, industrial design specialists, chemists and air quality technicians. Sources in the field comment that there is an unlimited career

potential for industrial hygienists (registered or not) and that in the ensuing years this profession will be in great demand.

F. Conclusion

Bureau personnel have indicated that the training capacities of the universities and colleges in Utah are inadequate at present. New entrants in the Bureau are not sufficiently prepared for the responsibilities which must be delegated to them. State level personnel would like to see the training in chemistry, physics and engineering revised. Air pollution expertise could be made more readily available to those students desiring to enter the air related fields.

The industrial sector of Utah has almost totally met compliance schedules. This year, two cases involved court action. Accelerating responsibilities relative to air pollution control and abatement will require the private sector to seek technically trained personnel.

II. NOISE

A. Introduction

Currently in Utah there is no state noise restriction. However, with the exception of Colorado, the state of Utah has the most active noise pollution control and abatement program in the Rocky Mountain prairie Federal Region VIII at the municipal level.

B. Workforce Profile

The Department of Social Services, Division of Health, Environmental Health Section has been designated as the lead agency in Utah for noise pollution control and abatement. The state noise program has been consolidated with the radiation program. (Refer to Section VI, Radiation.)

The following table details the current workforce at the state level for noise pollution control and abatement personnel.

TABLE III

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Environmental Health Section
Bureau of Radiological & Occupational Health
Noise Program
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Director	1	0%
Industrial Hygienist	2	0%
Secretarial	1	N/A
TOTAL	4	N/A

The Director shown on the above table does not devote full-time to the noise program. Radiation control and occupational health are also within this Bureau's purview.

Although there are no firm figures descriptive of the workforce at the local level as well as the private sector, state personnel estimate the total statewide workforce to be 50 professionals. It should be noted that some of these personnel are involved in other areas of responsibility than noise pollution control and abatement (for example, law enforcement).

There are five communities in Utah which currently have municipal noise ordinances. These may be seen on the following table. Regulations which include acoustical criteria are quantitative and therefore, are enforceable to a greater degree than those regulations without acoustical criteria.

TABLE IV

STATE OF UTAH

Municipal Noise Ordinances
(1976)

COMMUNITY	ORDINANCE								TOTAL		
	Aircraft	Building	Construction	Nuisance	Railroad	Vehicle	Rec./Vehicle	Zoning	a	b	
Murray				a		a			2	0	2
Ogden			a	a		a		a	4	0	4

TABLE IV

(continued)

COMMUNITY	ORDINANCE								TOTAL		
	Aircraft	Building	Construction	Nuisance	Railroad	Vehicle	Rec./Vehicle	Zoning	a	b	
Provo		a	a	a		a			4	0	4
Roosevelt				b					0	1	1
Salt Lake City			a	a	a	a	a	a	6	0	6
TOTAL State (a)	0	1	3	4	1	4	1	2	16	0	16
(b)	0	0	0	1	0	0	0	0	0	1	1
	0	1	3	5	1	4	1	2	16	1	17

KEY: a = regulation includes accoustical criteria;
b = regulation does not include acoustical criteria.

SOURCE: Sound and Vibration, December , 1976 .

C. Workforce Projections

Workforce requirements projected to 1982 are difficult in the area of noise control. State personnel anticipate few increases in staff at this level. These figures as well as the current workforce descriptions were

obtained through on-site interviews. The following table details workforce requirements for the state program.

TABLE V

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Environmental Health Section
Bureau of Radiological & Occupational Health
Noise Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Director	1	1	1	1	1	1	0%	0%
Industrial Hygienist	2	2	2	3	3	3	0%	10%
Health Physicist	0	0	1	1	1	1	N/A	N/A
Secretarial	1	1	1	1	1	1	N/A	0%
TOTAL	4	4	5	6	6	6	N/A	9%

D. Training and Certification

Currently in Utah there is very little in the way of training and/or certification in the environmental area of noise. However, Utah has vast energy resources to be developed. As energy extraction and/or conversion proceeds, communities will become increasingly aware of the ramifications of these activities as demonstrated by increased noise pollution.

Presently, state personnel lend technical assistance and expertise, when time allows, to local communities. This assistance may be in law enforcement officials in the proper utilization and maintenance of the

instruments which are used in noise programs. Developing increased awareness of the citizenry regarding noise pollution problems is also a component of the present program.

E. Career Potential

Increased regulation and control of noise emission will require development of special training programs, at the technical level in order to supplement the activities of the more highly trained specialists. Such careers may be termed environmental technicians. There will be a continuing need for university trained scientists and researchers but to a limited degree in Utah. Salary levels in the private sector will be higher than at the state or local level.

F. Conclusion

In view of the relatively recent development of noise pollution control as a distinct entity in the environmental control spectrum, activities, at least in Utah, are rather limited in scope. The present workforce at the state level consists of trained and experienced people specialized in the sciences.

Growth at the local level and in private industry will reflect a slow but consistant annual rate of approximately two percent. Noise control, however, will remain somewhat restricted in terms of the workforce, at least in Utah for the next three to five years.

III. PESTICIDES

A. Introduction

It may be said that pesticide usage came about in Utah in 1896. In that year the Board of Horticulture was established and their first rules and regulations were regarding orchard disinfection, spraying techniques and formulas. The trees of the lush orchards which had been planted by the early settlers were bearing inferior fruit and showing signs of deterioration. By the early 1900, superior quality fruits were again harvested.

Today, under the Utah Insecticide, Fungicide and Rodenticide Act, and the Utah Pesticide Control Act of 1971, the Department of Agriculture has been allocated the primary responsibility for pesticides related programs and activities within the state. The Department has been described overall in the preceding section "Utah Pollution Control and Abatement Agencies."

A Pesticides Control Committee has been established in order to provide assistance to the Department. Specifically this committee assists and advises the Commissioner and the Department regarding the establishment of rules and regulations pertaining to the sale, distribution, use and disposal of pesticides within the state.

B. Workforce Profile

The Division of Plant Industry of the State Department of Agriculture, administers programs which pertain to plants and plant products.

Responsibilities for plant related activities are increasing and represent a wide scope of programs. Included within these programs are cooperative pest control, enforcement of plant quarantines, and the supervision of the testing and licensing of private and commercial pesticides applicators. In addition, the Division staff provides general and technical assistance in the identification and control of pests.

The following tables detail the workforce in the area of pesticides in Utah. The table immediately following depicts the state agricultural personnel.

TABLE VI

UTAH STATE DEPARTMENT OF AGRICULTURE

Division of Plant Industry
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Division Director	1	0%
State Entomologist	1	0%
State Chemist[1]	1	0%
Inspector	14	1%
Chemist[1]	3	*
Secretarial (F.T.E.)	5	N/A
Secretarial[1]	1	N/A
TOTAL	26	1%

[1]Agricultural Laboratories Division

* unavailable

The table above includes the Director who is accountable for the entire Division. His responsibilities involve overseeing such activities as inspection of fruits and vegetables, grading produce, nursery

inspection; control of noxious weeds; and, inspection, sampling and testing of seeds.

The 14 inspectors continually monitor all pesticide materials which are for sale within the state. Economic poisons or pesticides compose a large variety of products which come under the purview of the law. Each of these products must be registered with the Office of the State Chemist, shown on the above table. A label, with a U.S. Environmental Protection Agency number, must accompany each application for registration, which is submitted annually. In 1974 there were 2,611 pesticide products registered with the State Chemist. This was an increase of approximately 13% over 1972. In 1976 a total of 3,291 pesticide products were registered. This more dramatic increase during the biennial approximated 25%.

The State Chemist as well as the other laboratory personnel, detailed on the above table, are part of the Agricultural Laboratories Division of the Department of Agriculture. The Agricultural Laboratories Division is responsible for the testing of pesticide products from across the State of Utah.

The activities of the State Entomologist, who is depicted in the above table, include a wide range of services. Pest survey and control programs, plant quarantines, and administration of the responsibilities of the State Bee Law are included among these activities. The State Entomologist directs the pesticides program for the Department.

The turnover rate throughout the Department of Agriculture is extremely low. Within the Divisions of Plant Industry and Agricultural Laboratories, the turnover rate is less than one percent. Department personnel attribute this low rate to a high level of job satisfaction, and a desire on the part of some workers to remain within the State of Utah for reasons of denominational preference.

Department of Agriculture personnel have estimated the number of pesticide related personnel within the state. The following table details this information.

TABLE VII

STATE OF UTAH

Pesticides Personnel
Current (1976) Staffing Level
(estimated)

Position	1976	%/annum turnover (average)
Private Applicator	7,000	N/A
Commercial Applicator	250	6%
Non-Commercial Applicator	250	4%
County Agency	26	*
TOTAL	7,526	N/A

* unavailable

By October 1977, persons who wish to apply restricted use pesticides on their own property or property under their control must be certified by the Department as private applicators. It has been estimated that in Utah 6,000 to 8,000 farmers may have to be certified in order to comply with federal requirements.

Commercial applicators are those persons who are engaged in the business of applying pesticides for a fee. These applicators must pass a written test indicating competency in the work they perform for hire.

The County Agents aid in training and supply technical assistance to farmers, ranchers and others upon request.

C. Workforce Projections

According to the Department of Agriculture personnel, no substantial numerical changes are expected to occur within the Division of Plant Industry or the Division of Agricultural Laboratories. With regard to both divisions, there have been no changes in staffing patterns during the past two years. During the next three to five years, no increases or decreases are anticipated in the workforce levels of these divisions. The following table depicts workforce requirements for applicators to 1982.

TABLE VIII

STATE OF UTAH

Pesticides Personnel
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Private Applicator	7000	7000	7000	7000	7000	7000	N/A	0%
Commercial Applicator	250	253	256	259	262	265	6%	1%
Non-Commercial Applicator	250	253	256	259	262	265	4%	1%
County Agent	26	26	26	27	27	28	*	1%
TOTAL	7526	7532	7538	7545	7551	7558	N/A	1%

* unavailable

D. Training and Certification

The Department of Agriculture and the Extension Service cooperatively are responsible for training and certification of both private, commercial and non-commercial* applicators.

The private applicator training and certification is expected to require an increasing percentage of time on the part of the State Entomologist and his staff as well as the Extension Service personnel.

The private applicators receive approximately a one-day intensive training, complete with handouts, audio visual support and quizzes. The following details the generalized basic format for the training sessions for the private applicator.

BASIC FORMAT TRAINING SESSIONS

PRIVATE APPLICATORS

- Overview of course
- Identification of Pests (weeds, mites, etc.)
- Pesticide laws and regulations (state and federal)
- Pesticide Terminology (and differences between pesticides, herbicides, rodenticides, etc.)
- Formulations (dusts, liquids, powders)
- Poisoning Cases (examples of incidents)
- Pesticide Labels and Labeling
- Pesticide Safety - (demonstrations of incorrect garments, etc. as well as correct garments and procedures)

*Non-Commercial applicators are those that apply pesticides to the property of others as part of their employment. These applicators include janitors, and city, state and county employees.

- Demonstration of application equipment (valves, hoses, nozzles, etc.)
- Identification of weeds specific to location of participants in state
- Livestock control; vertebrate (i.e., gopher control); agricultural pests (insects, i.e., corn worm)
- Review of entire course

Certification examinations for commercial and non-commercial applicators have been utilized to determine competency in compliance with the federal requirements.

The Department estimates that approximately 500 commercial applicators will be certified during the coming year. The applicator will be able to renew his license every year and will probably be required to be re-examined every three to five years.

The following table details the training efforts on the part of Division personnel and the Extension Service.

TABLE IX

STATE OF UTAH

Training Programs
- FY 1976 -

Sponsor	Number of Sessions	Length	Program	Number Trained	Number Certified
Department of Agriculture	8-10	1 day	Commercial Applicator Training	200	195
Department of Agriculture	1	1 1/2 days	Golf Course Superintendents	60	55

TABLE IX

(continued)

Sponsor	Number of Sessions	Length	Program	Number Trained	Number Certified
Department of Agriculture	1	2 day	Forest Service	*	*
Department of Agriculture	33/34	1 day	Private Applicator Training	*	2,300
Department of Agriculture	15 (schedules)	1 day	Private Applicator Training	N/A	N/A

* unavailable

E. Career Potential

Career opportunities in the area of pesticides in Utah will be limited due to the minimal increases in personnel which have been forecast statewide. However, death, promotion and change of career will create occupational opportunities. Degreed level personnel will be needed in research and in administrative capacities. The less than degreed career options will represent the most numerous occupational opportunities.

F. Conclusion

Economically speaking, agriculture is a major industry in the State of Utah. The Department of Agriculture is one of the oldest departments of the state government. Years of experience in various facets of agriculture make up the workforce currently charged with pesticide related responsibilities in the state. The pesticides program being administered through the Division of Plant Industry is well along in the development and implementation of the state's certification plan. The monitoring of pesticide products, the laboratory testing of pesticides and pesticide residues, and the registration of economic poisons (pesticides) are the major components of the Utah program.

The training and certification of both private and commercial applicators has accelerated. To date the Division of Plant Industry has accomplished 2,300 certifications of private applicators (farmers and ranchers). This facet of the federal program has been the recipient of little enthusiasm in many western agricultural states. However, only two complaints have been voiced regarding the training sessions and the subsequent demonstration of competency. Utah's program has been well received within the agricultural community. Thus far, approximately 400 of the 500 commercial applicators have been certified.

Continued concern to the farmers and ranchers of Utah is predator control, specifically the coyote. The coyote is Utah's greatest predator and major contributor to the annual $2 million loss to the livestock industry. In the last few years the lack of toxicants available for coyote control usage has contributed to a substantial increase in their population while the sheep population has declined.

The state legislature passed the "Agricultural and Wildlife Damage Prevention Act" in 1975, in an effort to address these problems and to maintain and promote agricultural production as well as wildlife resources. An Agricultural and Wildlife Board has been established which is composed of nine members appointed by the Governor. The Board prescribes policy, rules and regulations relative to the Act and the Commissioner of Agriculture has administrative authority. The law specifies acceptable methods of predator control. Due to the federal ban on use of toxicants, the use of airplanes and helicopters has become one of the most effective control mechanisms of the coyote population.

Career opportunities which are specialized and somewhat unique to the west are trappers and predatory control agents. But of increasing notice in the pesticide and predacide fields will be aerial related occupations other than crop dusters.

The field of pesticides may see passage of new state legislation during the 1977 biennial session. A new law has been drafted and submitted. Known as the "The Utah Pesticide Use and Application Act", this proposed law will broaden the Commissioner's authority in regard to implementing the requirements of the amended federal law.

IV. POTABLE WATER

A. Introduction

Utah, on one hand, is water poor like several western neighbors. It is the second driest state in the nation, with the total miles of permanent streams estimated at less than 6,000. On the other hand, Utah is an energy rich state. Utah has large crude oil reserves, is third in uranium supplies, and is overlain by vast low sulphur coal. Several energy extraction and conversion projects are now scheduled for the state. (Refer to Section VIII, Energy.) Not only will energy resource development affect water quality but it is, to a large degree, contingent upon availability of water. Therefore, quality and quantity are critical water issues in the state.

Utah state laws provide nearly all of the legal authority required for the state to assume primary enforcement responsibility under P.L. 93-523, the Safe Drinking Water Act. House Bill 171 will give the State Division of Health authority to require owners of public water works to notify users of violations of standards and provides for daily civil penalties for violations. This is one of the most controversial aspects of the current drinking water question. Utah has indicated intention to assume primary enforcement responsibility for the Safe Drinking Water Act. However, should the state not qualify for "primacy", the U.S. Environmental Protection Agency would, under the provisions of P.L. 93-523, directly manage and enforce the law in Utah. Further federal involvement in Utah is looked upon by some state personnel with less than total enthusiasm. The question of "primacy" will be determined during the early half of 1977.

State personnel currently estimate that there are 400 community water systems in Utah. An approximated number of non-community systems across the state is 500. These figures do not include federal and Indian lands.

Problems relative to drinking water in Utah are less numerous and less severe than in more populated and industrialized states. However, energy extraction and conversion activities will have an influence on the state's drinking water. This will be especially true in the smaller energy impacted communities.

B. Workforce Profile

The primary responsibility for potable water in the State of Utah has been allocated to the Utah State Division of Health, Bureau of Water Quality, Water Works Program. Information pertaining to workforce profiles and projections was obtained by means of on-site interviews with Division of Health personnel. Telephone and mail surveys provided secondary information sources.

The following table details the current workforce allocated to water supply at the state level.

TABLE X

UTAH DEPARTMENT OF SOCIAL SERVICES

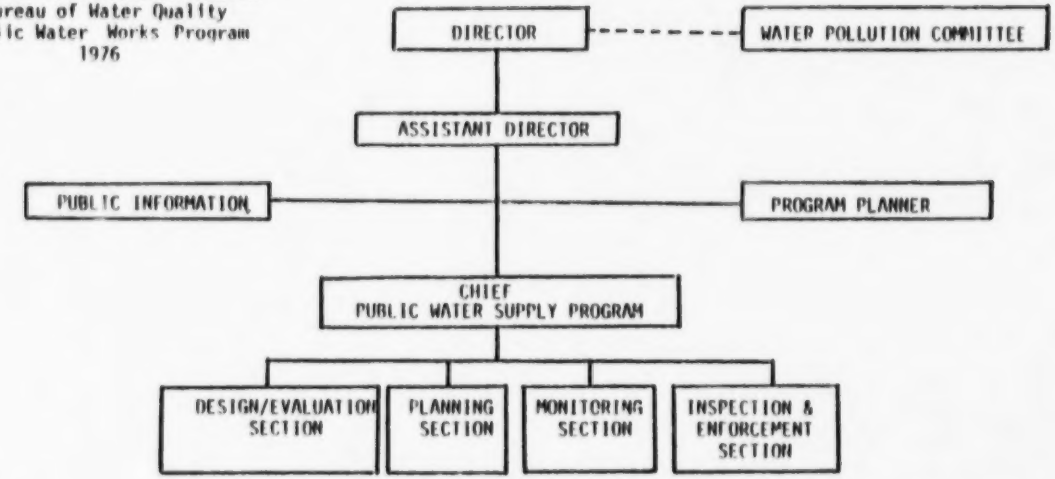
Division of Health
Bureau of Water Quality
Water Works Program
Current (1976) Staffing Level

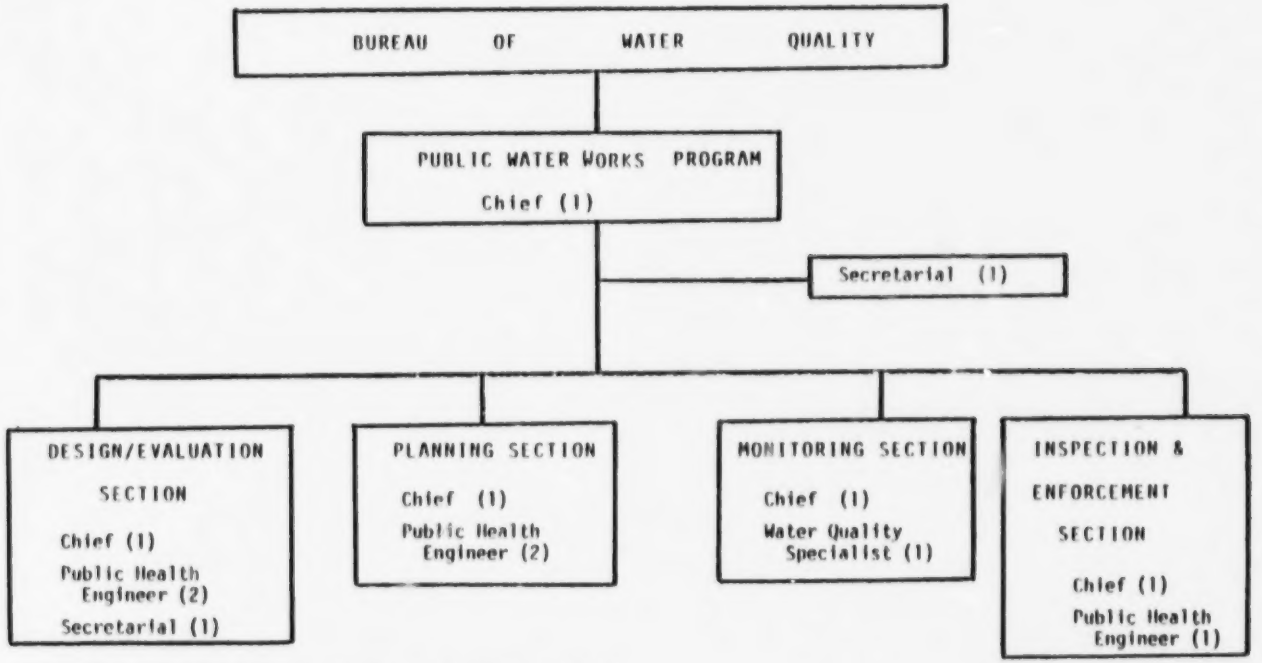
Position	1976	%/annum turnover (average)
Chief	1	0%
Public Health Engineer	5	6%
Water Quality Specialist	1	8%
Secretarial	3	N/A
TOTAL	10	N/A

Figure 6

ORGANIZATIONAL CHART

Bureau of Environmental Health
Bureau of Water Quality
Public Water Works Program
1976





UTAH DEPARTMENT OF SOCIAL SERVICES - DIVISION OF HEALTH
ENVIRONMENTAL HEALTH SERVICES BRANCH - BUREAU OF WATER QUALITY

Organizational Chart Figure 7

The Water Works Program conducts the following activities pursuant to the program objective to upgrade and maintain at adequate levels of purity all public water supplies in Utah:

- Prepare program plans and reports including State Plan, Annual Report and special studies;
- Develop and/or update standards, rules, policies and regulations in accordance with emerging technology;
- Review plans and provide technical assistance to municipal, state and federal agencies and officials;
- Monitor results of water works system analyses (in one year may number in excess of 36,000 reports);
- Evaluate groundwater problems and review classification of 400 systems;
- Conduct on-site inspections and evaluate water works facilities operations;
- Enforcement activities include legal coordination with federal, state, local and private agencies.
- Respond to emergency water supply problems;
- Public Information and operator and staff training;
- Update existing inventories and expand those systems not previously included.

The water supply and distribution workforce, composed mainly of operators has not been differentiated as to classification. It is estimated that there are approximately 1,000 persons occupationally involved in water supply and distribution in Utah. The turnover rate is approximately 20% in the operator category.

C. Workforce Projections

Workforce increases are needed in the Water Quality Bureau. Should Utah assume primary enforcement responsibility for the Safe Drinking Water

Act, new responsibilities and activities would be allocated to the water supply Section. The following table details workforce increases in this staff.

TABLE XI

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Bureau of Water Quality
Water Works Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Chief	1	1	1	1	1	1	0%	0%
Public Health Engineer	5	8	10	11	12	13	6%	22%
Water Quality Specialist	1	1	3	4	4	4	8%	47%
Environmental Health Specialist	0	1	1	1	1	1	*	20%
Secretarial	3	3	3	3	4	4	N/A	7%
TOTAL	10	14	18	20	22	23		19%

* unavailable.

The number of personnel, primarily water treatment and distribution system operators, involved in potable water programs will experience an increase of 10% per annum for the next two years; a per annum increase of 50% is anticipated to 1982.

D. Training and Certification

The Utah Environmental Systems Operators Training Program conducts workshops and seminars for water treatment facilities personnel. 200 hours

per year are ordinarily allocated to on-the-job training of water works personnel by the water works program staff. Approximately 200 operators per year receive training through this staff.

Presently there is no certification requirement for water treatment plant or water distribution system operators in Utah. However, there is a voluntary certification program, and most of the state's water treatment plant operators are currently certified.

The Water Works Program staff is involved in extensive interactions with all facets of the Utah population. Meetings, seminars and workshops are components of this interaction. The following table details these efforts.

TABLE XII

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Bureau of Water Quality
Water Works Program
Educational Activities
- 1976 -
(partial listing)

PRESENTATION TO	SUBJECT	(ESTIMATED) NUMBER OF PERSONS
Municipal Water Personnel	Utah Water Supply Survey	50
Salt Lake Area Utilities	P.L. 93-523	90
American Water Works Association	Training	100
Treatment Plant Operators	Status of Volatile Organics in Drinking Water Problems	12

TABLE XII

(continued)

PRESENTATION TO	SUBJECT	(ESTIMATED) NUMBER OF PERSONS
League of Cities	P.L. 92-523	200
Plumber's School	Cross connections	25
Western States Water Council	Safe Drinking Water Program	30
Five County Council of Governments	Safe Drinking Water Program	30

E. Career Potential

Career opportunities will be available on the operator level in all classifications. Laboratory certification, along with other ramifications of the Safe Drinking Water Act, will augment this growth. Specific staffing increases in both areas will depend on the degree to which legislative mandates can be met. Funding levels, e.g., federal support for state programs and the accompanying state commitment, will be a determinant in meeting established regulatory guidelines.

As previously indicated, operators and laboratory personnel will represent the most significant areas of growth. However, there will be positions at the state level for engineers, micro/macro biologists, computer specialists, hydrologists, chemists and planning personnel. Fewer of these positions will be available at the local level in the more sophisticated operations as will positions for individuals trained in pump design, maintenance and overall management of operations.

F. Conclusion

Water in Utah, as in other western states, is a premium commodity. To protect the individual citizen as well as the community and to provide protection against inadequate and improperly designed water supply systems is the overall goal of the Water Supply Section. In the past, non-community supplies were not of primary concern. With the passage of the Safe Drinking Water Act (PL 93-523) this particular area has begun to be addressed by the people of Utah.

Most communities in Utah, even the small rural towns, continue to increase their population. Unfortunately, their water utilities are not always upgraded accordingly. The state is currently addressing these problems. While monitoring and inspection are critical to the continued adequate functioning of a water supply, the training of operators in the rural areas especially has been identified as a major problem. However, historically, the Water Works Program has been understaffed. This pattern hopefully will not be continued. Of increasing interest is the future fate of Utah's assumption of primary enforcement responsibility under the Safe Drinking Water Act. This will be left to the citizens through the biennial meeting of the Legislature in early 1977.

V. RADIATION

A. Introduction

Problems related to radiation and radioactivity are not as serious in Utah as in some other states. Utah does have uranium mining and milling and, therefore, tailings are a source of concern for those professionals involved in radiation control. Currently, there are at least five sites where uranium tailings are located across the state. Utah citizens are also concerned that the state's salt dunes will become sites for radioactive waste disposal.

The Radiation Protection Act, effective since 1967, is the enabling legislation for radiation protection regulations by the state. This legislation permits the state to obtain "agreement" status with the Nuclear Regulatory Commission (NRC). A state is termed an "agreement" state after it has entered into an agreement with the NRC in which certain of the Commission's responsibilities are transferred to the state under the terms of Section 274 of the Atomic Energy Act of 1954. To date, however, Utah has not sought this agreement with the Nuclear Regulatory Commission.

B. Workforce Profile

The primary responsibility for radiation control in the state has been allocated to the Utah Department of Social Services, Division of Health, Environmental Health Section, Bureau of Radiological & Occupational Health. The staffing currently is not extensive; however, the program is not extensive. The following table details the current workforce.

TABLE XIII

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Environmental Health Section
Bureau of Radiological & Occupational Health
Radiation Program
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Director	1	0%
Assistant Director	1	0%
Health Physicist	2	1%
Secretarial	1	N/A
TOTAL	5	N/A

The Director and the Assistant Director shown above allocate the majority of their time to the area of occupational health. The turnover is exceedingly low. For example, a professional position became vacant and was filled approximately two years ago.

The Utah Department of Employment Security have estimated that the total number of personnel occupationally exposed to radiation through the medical/dental/veterinary use of X-ray is approximately 260. According to the Energy Research and Development Administration publication #78, An Analysis of Nuclear Related Technician Manpower in Western States, there are approximately 91 persons involved in radiation control activities at the technician level.

The following table describes the estimated workforce in radiation control across the state.

TABLE XIV

STATE OF UTAH

Radiation Personnel
Current (1976) Workforce Level
(estimated)

Position	1976	%/annum turnover (average)
Accelerator Operator	1	*
Radiation Control Technician	4	*
Radiochemist	2	*
Radiographer	10	*
Well Logger	2	*
Radiologic Technologist	43	*
Radiation Therapist	9	*
Radiobiology Technician	20	*
TOTAL	91	N/A

* unavailable

Although specific turnover figures are unavailable for the personnel listed on the above table, evidence suggests that it would be quite low, as is true of other occupational categories of this nature in Utah.

C. Workforce Projections

Professionals in the field of radiation control in Utah estimate that there will be slight workforce increases to 1982. The following table describes these increases for the state level personnel.

TABLE XV

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Environmental Health Section
Bureau of Radiological & Occupational Health
Radiation Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Director	1	1	1	1	1	1	0%	0%
Assistant Director	1	1	1	1	1	1	0%	0%
Health Physicist	2	2	3	3	4	4	1%	17%
Secretarial	1	1	1	1	1	1	N/A	0%
TOTAL	5	5	6	6	7	7	N/A	7%

Predicted on information obtained from on-site and telephone survey interviews, the statewide workforce should experience a two to three percent per annum growth over the next three to five years. The turnover rate is expected to remain exceedingly low.

D. Training and Certification

Personnel may attend courses at Utah State University or government sponsored seminars. Professional meetings offer attendees an opportunity to learn of current issues and activities. Travel for state employees is maintained at a minimum and would be even more difficult if the destination is out of state.

The following table details some available types of training in Utah in the radiation control fields.

TABLE XVI

STATE OF UTAH

Radiation Control
Available Training
(1976)

INSTITUTION	COURSES
University of Utah Medical Center, Salt Lake City	Radiologic Technology
U.S. Veterans Hospital, Salt Lake City	Radiologic Technology
Latter Day Saints Hospital, Ogden	X-Ray Technician Radiologic Technology
Radiation Center, Salt Lake City	X-Ray Technician
Utah Technicial College, Provo	Nuclear Facility Maintenance

SOURCE: An Analysis of Nuclear Related Technician Manpower in Western States, U.S. Energy Research & Development Administration, publication #78, November, 1975.

E. Career Potential

Career opportunities will be available especially at the degreed level in Utah. However, these offerings will be limited. Should Utah become an "agreement" state, job opportunities at the state level would increase somewhat. Nuclear expertise would be more in demand.

There is little evidence to suggest that new career options will emerge in the radiation field in Utah.

F. Conclusion

Radiation control is a relatively small program in Utah at present. Evidence suggests that expansion will be kept to a minimum.

The private sector will be responsible for the majority of the workforce increases in the field of radiation in Utah. The salaries will be higher and turnover maintained at its current low level. The development of power plants in the state will affect the workforce profile in the near future.

VI. SOLID WASTE

A. Introduction

With the exception of one incinerator site, solid waste in Utah is disposed of at landfill sites. The Utah Bureau of Solid Waste Management, under the Environmental Health Services branch estimates that there are approximately 230 "legal" landfill sites in Utah, although this estimate is tempered by the consideration that approximately 85% of these sites are not in total compliance and therefore, are not strictly "legal." If a landfill site is operating without major violation (particularly as it pertains to public health), although not in 100% compliance, the Bureau of Solid Waste may classify the site as legal. In the first quarter of FY 77, the Bureau surveyed a total of 176 sites finding nine in 100% compliance, 13 in 75% compliance, 16 in 50% compliance and 138 with less than 50% compliance. A total of four dumps were closed in this period. The Bureau considers at least 20 other additional sites in the state illegal.

In comparison with the larger states, Utah has proportionately many small communities, most not larger than 5,000. A trend that has begun in solid waste management in the state is the consolidation of the scattered, isolated solid waste disposals system within these small communities into a county-wide area disposal system which facilitates more efficient means of disposal at cheaper costs.

A major priority that the Bureau has identified for 1977 is the closing of illegal dumps. An ancillary priority to this will be an attempt on the Bureau's part to give more technical assistance to those "illegal"

sites (not in 100% compliance). During the yearly inspection of sites, the Bureau will strive to update the sites with technical assistance and better on-site operator training. The 1974 regulation deadline for compliance in Utah will be enforced more stringently by the Bureau in 1977.

Utah and Salt Lake County are conducting studies to determine the feasibility of Resource Recovery sites. Two obstacles have been identified: time and money. Utah County decided to consolidate their collection system two years ago and achieved considerable success. The County then hired a private firm to propose, construct and carry out a Resource Recovery program. The firm submitted plans to the County which were accepted and a transfer station and two adjoining buildings were built. Unfortunately, construction costs were underestimated, delays occurred (i.e., air quality restrictions) and, financial backing was withdrawn. The County then took over operation and formed the Utah Solid Waste Disposal District. The County achieved some lease funding support and their resource recovery efforts continue. Salt Lake County, on the other hand, is a long way from a functioning resource recovery system but is conducting engineering and marketing studies.

Hazardous wastes will be a top priority for the Bureau in 1977. The Bureau is in the process of determining the extent of the generation of hazardous material and where disposal sites should be established. Presently, disposal is handled on a case-by-case basis. No sites have been stipulated solely for hazardous waste disposal. To assess this problem the Bureau of Solid Waste Management surveyed 50 landfill sites (which are already handling hazardous materials) to determine which should be upgraded in order to permanently handle hazardous waste disposal.

B. Workforce Profile

The staffing level of the Bureau of Solid Waste Management is composed of the Bureau Director and two solid waste specialists (sanitarians).

The staff of the Bureau of Solid Waste Management responsibilities and duties are: legislation and regulations; inspection and enforcement; hazardous waste management; resource recovery and source reduction; training; public information evaluation and reporting; strategy development and plan coordination.

The Bureau writes comprehensive solid waste legislation and amendments, promulgates new legislation, reviews regulations and legislative authority and develops and amends regulations in solid waste, hazardous waste management, resource recovery and source reduction.

Also, the Bureau must inspect all waste disposal sites at least once a year, enforce sanitary landfill operation regulations (close dumps, upgrade landfills) and review new plans while providing technical assistance to municipalities. The Bureau has the responsibility to write a state Hazardous Waste Management Plan, survey hazardous wastes generated in the state with a listing of hazardous waste haulers, establish hazardous waste disposal sites in the state and license hazardous waste haulers and establish required haulers' reports.

Responsibilities in resource recovery and source reduction include: determining and publicizing reclaimed waste markets; developing procedures for banning selected, non-recyclable containers and other hard-to-dispose-of waste generated in the state.

Training duties include the development/upgrade of landfill operator training courses, the training of landfill operators, the training of local and county planners in solid waste management, and the provision of training for the Bureau staff.

The Bureau must also evaluate solid waste management and program effectiveness and prepare quarterly reports for the state and the EPA. Providing technical assistance on alternatives for financing and coordinating planning are also designated responsibilities of the Bureau.

There are 29 counties in Utah divided into 15 health districts and within these districts there are approximately 20 registered sanitary and health officers who are involved in public health aspects of solid waste management. Also, local government officials, such as county commissioners, are involved in solid waste management and their numbers total approximately 50.

Private sector workforce levels have been estimated by professionals at the Bureau of Solid Waste Management. Estimates are based on an average crew size (two to three people) of the larger municipalities supplemented by estimates based on field observation by the state.

The Bureau estimates that there are 15 to 20 private hauling firms operating in Utah and these are mostly one-person operations. The private sector workforce staffing level is listed below.

TABLE XVII

STATE OF UTAH

Solid Waste Management Personnel
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Landfill Owner/Operator	230	20%
Heavy Equipment	22	25%
Engineering Consultants	20	5%
Incinerator Operators	2	N/A
TOTAL	274	N/A

The number of landfill owner/operators is based on the fact that Utah has at least 230 landfill sites which require, at the minimum, one operator.

C. Workforce Projections

Workforce projections stated below were provided by sources at the Bureau of Solid Waste Management and represent the best professional judgement of the Bureau's personnel.

Historically, the Bureau of Solid Waste Management is one of the state's smallest bureaus and its requests for additional personnel are considered low on the priority list. Accordingly, the Bureau hopes to add another solid waste specialist within the next two years. Speculation beyond that point is most difficult.

Presently, Utah has no permit system for landfill sites. The Bureau reviews plans and approves sites since the Utah legislature has not given legal authority to issue permits. Legislative action creating a permitting system is not foreseen for another two years at least.

The Bureau feels that when legal authority is granted, staffing levels will increase.

The Bureau of Solid Waste Management was only created a few years ago and it has yet to experience any turnover.

Resource recovery activity and efforts to confront the hazardous waste problem will increase Utah's private sector solid waste workforce 20% over the next five years. Efforts are presently underway to consolidate landfill sites and this will either decrease slightly or stabilize the number of landfill operators. Heavy equipment operators will experience a three to five percent per annum growth. If resource recovery sites are established, at least five weighmasters will be added to the workforce.

The turnover rate for landfill operators is quite high (30-50%) in Utah due to poor salaries and lack of upward mobility. Once the operator develops skills on heavy equipment operation he often forsakes the solid waste field and goes into construction.

In summary, workforce projections for solid waste in Utah can expect a three to five percent per annum growth among heavy equipment operators, spotters and collectors. Consolidation of sites will stabilize the present number of legal sites (230) and will effect numbers of landfill operators.

D. Training and Certification

There is no formal training program for landfill operators. During inspection visits to sites, however, Bureau personnel instruct operators

on better solid waste management techniques. The Bureau considers this a low-key, ineffective approach to training, but feel that this is the best they can accomplish. Attempts to bring the operators in to Salt Lake City for central training have failed since the community is reluctant to let the operator go for the day and the operators have no interest in night classes.

The Bureau takes advantage of any training available to upgrade the staff. Listed below are the training sessions that the Bureau attended during the period 1976-1977.

TABLE XVIII

STATE OF UTAH

Training Program
FY 1976 - FY 1977

Sponsor	Date	Length	Program	Number Trained (from Bureau)
EPA Regions VIII & IX Salt Lake City	Dec. 19-21, 1976	2 days	To discuss/exchange information on solid waste management among the states	3
EPA	Feb. 7-8, 1977	2 days	COMIS system (computer model for record keeping) HEURISTIC Routing (routing system for collection)	2
EPA/California State San Francisco	Feb. 1-4, 1977	4 days	Hazardous Waste Disposal	2
National Conference of Solid Waste Management	Nov. 1976	4 days	All aspects of solid waste management	1

The February EPA training seminar on the COMIS and HEURISTIC system was considered most successful by the Bureau. Knowledge of these systems will be available to the larger municipalities in Utah in the near future.

EPA has conceived IRIS (Injury Reporting and Information System) which the Bureau feels is excellent. The Bureau will be conducting training seminars with collectors in various counties to inform them of this system.

The Bureau has recently helped to form the Utah Chapter of Government Refuse Disposal Association which will keep people in solid waste management in Utah abreast of current developments and activities in other states.

There is presently no certification of landfill operators in Utah because the operators salaries are too low to make certification a feasible or accomplishable goal.

E. Career Potential

While the Bureau comments that more emphasis will be given to enforcement and there will be more increased activity in hazardous waste management, career potential is still limited in Utah to the standard positions. landfill operator, heavy equipment operators and collectors.

This will change as resource recovery sites and established hazardous waste sites are developed. Trained engineers, geologists, and hydrologists will be instrumental in the planning, development and operation of these sites. Integrated planning with the Bureau and these selected personnel will be needed in order to select proper sites and coordinate their operation.

Specially trained personnel will be needed for the operation of resource recovery and hazardous waste sites and training for these personnel may be accomplished through university programs and at vocational/technical institutions and community colleges in the near future.

F. Conclusion

Several priorities and problems have been identified by the Utah Bureau of Solid Waste Management which require immediate attention. These problems are summarized below with some of the Bureau's recommendations.

Federal money has decreased in recent years for training of landfill operators. Training programs for operators who historically are undertrained, if not completely lacking in proper solid waste management knowledge, must be re-established through federal money. This need is made even more acute as hazardous waste disposal has increased in recent years.

Proper site selection for the disposal of waste, mostly generated by the mining and oil industry, is an immediate priority of the Bureau. Utah has only three or four large cities. Five hazardous waste disposal sites, properly planned and executed, would adequately handle hazardous waste disposal in Utah.

Utah is presently updating their state plan to meet the Resource Conservation and Recovery Act of 1976. They are considering approaches never tried before (resource recovery sites, landfill site selection plans, operation/maintenance) in the hopes of greater success.

The population centers of Utah follow the Wasatch Mountain Range and, because of water conservation, most of the population follows the western face of this range. This occurrence has hampered the selection of landfill sites since this area is restricted by boundary limitations of a mountain range and water quality conditions.

In the highly concentrated metropolitan areas, a properly designed landfill site or a functioning resource recovery system would serve perhaps 75 percent of the state needs in solid waste disposal. This is the kind of development the Bureau would like to see actualized as it is a viable solution to land use planning and water pollution problems related to solid waste disposal.

Financial constraints on small municipalities are seen by the Bureau as the most overwhelming problem facing local disposal systems. The finances resulting from the requirements the Bureau may ask for in a local landfill site may well exceed a community's yearly budget. This is another reason enforcement is so difficult; compliance cannot be met where there is no money to develop proper sites.

VII. WASTE WATER

A. Introduction

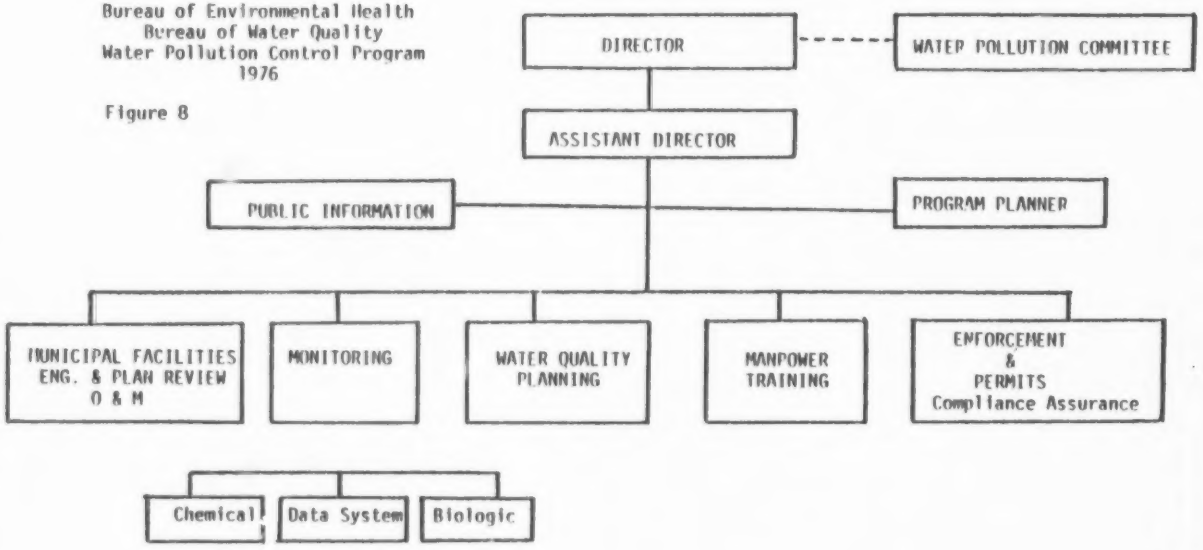
Utah's Water Pollution Control Act was passed in 1953 as the result of an intensive campaign to inform the public of the need for effective water pollution control. In 1974, the Water Pollution Committee, under the authority of the Water Pollution Control Act, established interim effluent quality standards to achieve and/or to maintain the 1972 classification of state waters. The Utah Division of Health, Environmental Health Services Branch, Bureau of Water Quality, has the goal of achieving the 1972 classification by 1983. To date the state has not assumed the National Pollution Discharge Elimination System (NPDES) program. Senate Bill 257, however, would give Utah the authority for the NPDES program, and will be under consideration during the 1977 biennial legislature. The Bureau and the Attorney General's Office are not optimistic of passage, due in part to the Water Works Association.

Most of Utah's sewered communities now have secondary treatment for waste water. The municipal treatment facilities presently include 46 mechanical facilities and 40 lagoon facilities (water stabilization ponds). Smaller communities recently have constructed total containment lagoons in recognition of the difficulty of upgrading lagoon effluents to level III quality. Communities with projects for new treatment facilities are encouraged to design facilities to meet the state's 1980 level III effluent standards. Raw sewage discharges and overloaded treatment plants are problems identified by the Bureau, as attempts are made to meet secondary

ORGANIZATIONAL CHART

Bureau of Environmental Health
Bureau of Water Quality
Water Pollution Control Program
1976

Figure 8



treatment effluent standards by mid-1977. Under Section 208 of the Federal Water Pollution Control Act (PL 92-500) regional comprehensive planning is required. Section 208 and construction grants planning will present the greatest challenges to the Bureau of Water Quality. Realizing inadequate manpower within the Bureau, work will be subcontracted.

B. Workforce Profile

Information for the workforce profile, as well as projections, was obtained through on-site and telephone interviews with personnel from the Bureau of Water Quality. It is representative of professional judgement of those working in the field.

In compliance with state statutes, the Bureau of Water Quality, Water Pollution Control Program, has the following responsibilities and duties: Engineering and Plan Review; Operation and Maintenance; Monitortoring and Surveillance; Water Quality Planning; Manpower Training; and, Enforcement and Permits.

The Water Pollution Control Program administers the construction grants program while reviewing plans for municipal, industrial, agricultural and subdivision facilities. Accordingly, their responsibilities also include: evaluating new procedures; technical assistance; revising design standards; and operation and maintenance manuals. In addition, the Program must carry out a monitoring and surveillance program; permits for industrial, municipal and agricultural discharges; field studies; implementation plans; standards and classification; and, inspections/enforcement.

Public health engineers dominate the Water Pollution Control staff due to increased plan review for administering the construction grants program. The distribution of staff is shown on the following table.

TABLE XIX

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Environmental Health Services Branch
Bureau of Water Quality
Water Pollution Control Staff
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Administrator	1	0%
Public Health Engineer	12	8%
Environmental Health Specialist	4	6%
Aquatic Ecologist	2	0%
TOTAL	19	N/A

Engineers include: chemical, sanitary and civil. Six of the engineers are registered professional engineers; the remainder have not accumulated enough experience to become registered although they are degreed. Three of the positions are on loan from the U.S. Soil Conservation Service while one is from the U.S. Environmental Protection Agency.

Five industrial wastewater system specialists from the Bureau of Sanitation, Environmental Health Services, are responsible for wastewater activities which include inspection of industrial wastewater disposal systems and review of plans for subdivision systems (septic tanks).

The state classifies wastewater operators I through IV (I is highest). A wastewater operator who fails the class IV exam may have a special

class V rating. The Bureau of Water Quality is presently in the process of inventorying the number and classification of wastewater plant operators. An exact number of operators cannot be determined at this time. Bureau personnel estimate, however, that there are 150 wastewater operators in Utah, predominantly in class II and class III.

The average crew size for a wastewater treatment plant ranges from one member at the smallest plant, to one foreman and three operators at the largest plants in Salt Lake City. Starting salaries for operators are the lowest in the six-state Federal Region VIII.

C. Workforce Projections

Bureau personnel indicate that projections for their staff are dependent upon whether Utah assumes delegation for the NPDES program from EPA, as well as for the number of construction grant programs that the Bureau will have to administer during the next five years. Listed below are projections to 1982 for the Water Pollution Control staff, Bureau of Water Quality, assuming the addition of no significant programs.

TABLE XX

UTAH DEPARTMENT OF SOCIAL SERVICES
Division of Health
Environmental Health Services Branch
Bureau of Water Quality
Water Pollution Control Staff
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Public Health Engineer	12	13	14	14	15	15	8%	5%
Environmental Health Specialist	5	5	6	6	7	7	6%	7%

TABLE XX

(continued)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Water Quality Specialist	0	4	4	5	5	5	0%	5%
Aquatic Ecologist	2	2	3	3	3	3	0%	10%
TOTAL	19	24	27	28	30	30	N/A	6%

If Utah assumes the NPDES and construction grants programs, projected requirements will be as follows:

TABLE XXI

UTAH DEPARTMENT OF SOCIAL SERVICES

Division of Health
Environmental Health Services Branch
Bureau of Water Quality
Water Pollution Control Staff
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Public Health Engineer	12	13	15	17	18	19	8%	10%
Environmental Health Specialist	5	5	6	7	7	7	6%	7%
Water Quality Specialist	0	4	5	5	7	7	0%	13%
Aquatic Ecologist	2	2	3	3	3	3	0%	10%
TOTAL	19	24	29	32	35	36	N/A	10%

The turnover rate of 8% for public engineers represents the loss of approximately one engineer per year.

New hires for fiscal year 1977 will be replacements due to turnover, which is quite low. The Bureau is still concerned about lack of manpower and increasing responsibilities. According to Water Pollution Control Program Play for FY 1976:

> The implementation of administrative guidelines promulgated by EPA pursuant to the FWPCA Amendments of 1972, has imposed severe staffing and budget requirements that exceed State capabilities. For the State to increase efforts in program activities as stated in the FY 76 planned outputs, the continued availability of Federal incentive funds and increased program funds in non-incentive areas will be required to meet the conditions of the Federal guidelines. Such increased activities will also depend upon the State's ability to recruit adequately qualified additional personnel.

Growth of wastewater operators is dependent upon increase in number of facilities during the next five years, and upon upgrading of existing plants. This proportional relationship is contingent on a variety of factors: the trade off on the number of mechanical facilities which are being phased out and the number of lagoon facilities built in their place (which are the preferred type of treatment plant presently being built in Utah), the availability of federal funds for the construction grant programs, in the eventuality that regionalization will be accomplished on 208, what effect this occurrence may have on the number of operators in the state and, most importantly, the attitude of the management of a wastewater treatment plant in what they will require in terms of numbers of personnel.

The Bureau states that, historically, the number of operators in the state has remained stable, with only one plant in recent years increasing

its staff by more than a few employees. For example: the South Salt Lake City plant in the 1950s was operated by a three man crew. The same size crew operates that plant today. The Bureau also comments that the incremental growth of the population of the state during the next five years will not effect the numbers of operators. There has been no increase in the number of operators during the last 3 years. The Bureau projects a five percent annual increase in number of operators to 1982. Operator turnover is estimated at 25%.

D. Training and Certification

Utah statutes do not require certification for treatment plant operators, but those operators that meet certain requirements do receive certificates under a voluntary program.

One operator training instructor is included on the Water Quality staff. The following training programs were conducted during 1975 and 1976.

TABLE XXIII

STATE OF UTAH

Waste Water Training
(1976)

SPONSOR	LENGTH	PROGRAM	NUMBER TRAINED
Bureau of Water Quality (BWQ)	1 day (given 5 times)	Waste Stabilization Pond Seminars for lagoon treatment plant operators	49
Bureau of Water Quality	1 week	Introduction to Waste Water Treatment	18

TABLE XXII

(continued)

SPONSOR	LENGTH	PROGRAM	NUMBER TRAINED
Bureau of Water Quality	1 week	Screening and Grit Removal	26
Bureau of Water Quality	1 week	Primary Clarifier	26
Bureau of Water Quality	1 week	Trickling Filters	18
Bureau of Water Quality	1 week	Activated Sludge	22
Bureau of Water Quality	1 week	Digestion	18
Bureau of Water Quality	1 week	Chlorination	14
Bureau of Water Quality	1 week	Laboratory	17
Bureau of Water Quality	1 week	Summary	12
Bureau of Water Quality	1 week 1 week	Advanced Wastewater Treatment Plant Operation	* *
Utah Water & Wastewater Joint Training Program	9 weeks	All aspects of Wastewater Operation	*
Utah Water & Wastewater Joint Training Program & Bureau of Water Quality	1 week	Wastewater Collection System Course	14
Bureau of Water Quality & EPA	5 days	Instructor Techniques	14
Bureau of Water Quality/EPA	1/2 day	O & M Manual Preparation Seminar	26
Bureau of Water Quality	1 day	Instructional Development Workshop	24

*available.

For FY 77, the Bureau of Water Quality has planned training courses for introduction to wastewater treatment plant operations, advanced wastewater treatment plant operations, correspondence courses for wastewater treatment plant operators and a training program co-sponsored by the American Water Works Association and the Utah Water Pollution Control Association.

The State Division of Health and the Utah State University Extension Service developed a "Coordinated Training Committee" through an EPA training grant which has been endorsed and is co-sponsored by the Division of Health, Utah Water Pollution Control Association, the American Water Works Association, League of Cities, and Utah State University Extension Service. The committee's purpose is to coordinate and develop operator training for the entire state.

The Bureau of Water Quality encourages staff personnel to continue their education through advanced degree programs, technical seminars and training courses. The state has a limited travel budget which restricts attendance at out-of-state training sessions.

D. Career Potential

Career opportunities for employment within the Bureau of Water Quality will remain the greatest for public health engineers during the next five years. In the private sector, engineers employed by consulting firms will be in demand. The Bureau of Water Quality will be subcontracting more work in the next five years, and engineers are the primary recipients.

The career potential for wastewater operators appears to be limited to 5% to 10% per annum growth, at least until 1980. If Utah receives

additional federal funding for building new wastewater treatment plants or for upgrading existing facilities, career potentials for operators would improve. In that event, the per annum growth for operators after 1980 would rise to 20 or 25 percent. Personnel involved in management activities would be affected in the same manner.

F. Conclusion

The Bureau of Water Quality indicates that in order for the state to assume responsibility of the NPDES program and the construction grants program, the Bureau would require staff increases of 13, specifically public health engineers. Senate Bill 257 would give Utah the authority to assume responsibility for the NPDES program. This will be considered during the 1977 biennial meeting of the Utah State Legislature. Even if the state were to assume this authority, it is questionable that the Bureau would have enough personnel to adequately execute the program.

Regarding the construction grants program, the Utah Bureau of Water Quality is skeptical of the possibility of administering this program. The federal government has yet to forward a proposal that would allocate resources to the state for assumption and implementation.

The newly formed "Coordinated Training Committee", developed by the State Division of Health and the Utah State University Extension Service and funded by an EPA training grant, will be instrumental in addressing the state's training program needs for wastewater operators, plant managers, superintendents, and city managers. This committee is still in the formative stage, but the state will look to this organization to fulfill future training needs.

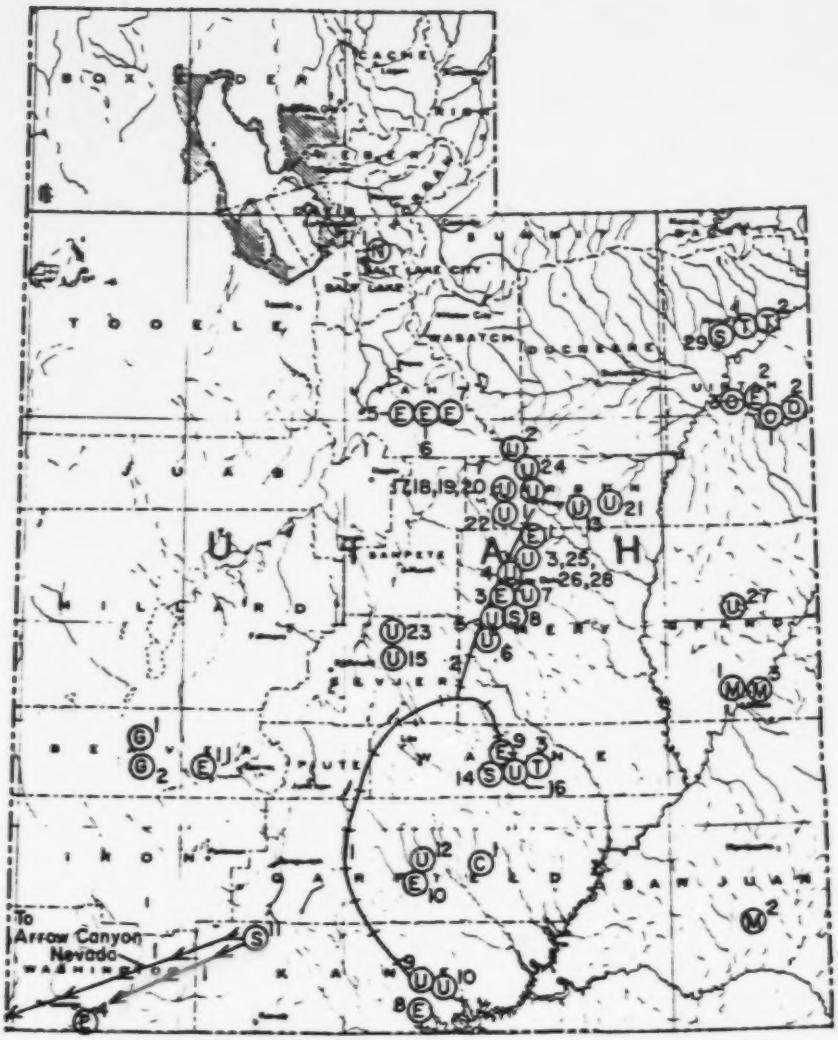
VIII. ENERGY

A. Introduction

Utah has an abundant supply of easily extractable energy resources which include oil shale, uranium, geothermal and high quality, low sulphur bituminous coal. According to the Bureau of Mines publication #8719, Projects to Expand Fuel Sources in Western States, May, 1976, a multitude of energy related projects are scheduled for the state. Included in the projects, which are depicted on the following page, are 29 new or expanded coals mines, 10 electric power plants (not including the recently cancelled Kaiparowits plant), and three uranium mines. Of increasing interest are other projects planned for Utah which include one coal gasification plant, three oil shale underground projects, three tar sands oil extraction projects, one coal slurry pipeline and two proposed railroad spur line additions. Characteristic of Utah and several other western states are geothermal possibilities. Two such facilities are proposed for the state. Previous drilling results have been favorable and drilling and testing will continue through 1979 with a possible power plant to be constructed in 1980-1985. As in many western states, future energy extraction and conversion activities will be an integral component of Utah's future.

B. Workforce Profile

There are several agencies in Utah to which responsibilities and activities have been delegated regarding energy and pollution control and



LEGEND

- (S) Strip coal mine
- (U) Underground coal mine
- (E) Electric powerplant
- (O) Oil shale project
- (T) Tar sands project
- (G) Potential geothermal facility
- (M) Uranium mine
- (N) Waste-to-energy conversion plant
- (C) Coal conversion plant
- Railroad
- Coal slurry pipeline

FUELS RELATED PROJECTS

SOURCE: Projects to Expand Fuel Sources in Western States, Bureau of Mines, May, 1976.

Figure 9

abatement. The Utah Department of Natural Resources, Utah State Planning Office and the Utah Interdepartmental Coordinating Council for Energy Affairs are the major agencies with energy responsibilities. Information regarding the workforce profiles and projections were obtained through on-site interviews, as well as telephone and mail surveys.

The Department of Natural Resources Division of Oil and Gas Conservation encourages the development, production and utilization of oil and gas in such a manner as to prevent waste and encourage conservation. This Division is granted authorization by the state's Oil and Gas Conservation Act, as well as the Mined Land Reclamation Act. The following table depicts the current staffing levels.

TABLE XXIII

UTAH DEPARTMENT OF NATURAL RESOURCES

Division of Oil & Gas Conservation
Current (1976) Staffing Level

Position	(a)	(b)	1976	%/annum turnover (average)
Administrator	1	0	1	0%
Administrative Aide	1	0	1	0%
Petroleum Engineer	1	0	1	1%
Geological Engineer	0	1	1	1%
Biological Engineer	0	1	1	0%
Statistician	1	0	1	0%
Secretarial	4	1	5	N/A
TOTAL	8	3	11	N/A

(a) oil and gas;
(b) mining.

The prevention of unnecessary well drilling, mined land reclamation, and the protection of the public's health and safety are responsibilities of this Division. The two sections of the Division work cooperatively.

The State Planning Office is under the aegis of the Governor and acts in an advisory capacity to him as well as to state and local agencies. The major activity is policy and program coordination. There are three Divisions with a total workforce of 52 as depicted on the following table.

TABLE XXIV

UTAH STATE PLANNING OFFICE

Current (1976) Staffing Level

Position	(a)	(b)	(c)	1976	%/annum turnover (average)
Director	1	1	1	3	0%
State Planning Coordinator	1	1	1	3	**
Senior Level Professional[1]*	7	4	10	21	20%
Middle Level Professional, including Researcher, Data Collector, Analyst[2]*	5	3	5	13	20%
Secretarial[3]	2	2	8	12	20%
TOTAL	16	11	25	52	20%

(a) Policy Planning Section;
(b) Technical Services Section;
(c) Labor & Training Section;
* estimated; ** unavailable;

[1]Specific occupational titles not identified;

[2]Specific occupational titles identified but not assigned quantitatively;

[3]Includes budget and data processing.

Identified as the lead energy agency in Utah to coordinate all energy related activities is the Interdepartmental Coordinating Council for Energy

Affairs. The major purpose of this agency is the review of various state departments' policies affecting production, distribution, and consumption of energy and energy producing fuels. This agency acts as the liaison between federal, state and local government.

The current workforce is composed of one State Energy Coordinator, and part-time utilization of personnel from other state departments. The agency views the major energy related problems in Utah as energy development on federal lands, extensive development of coal resources, and socio-economic impact of petroleum development on rural areas. As this is a relatively new agency, the turnover rate is non-existant.

The private sector workforce profile has not been included as no figures are available at this time.

C. Workforce Projections

Because Utah is an energy resource state and developmental activities impact several aspects of state and local government, the workforce involved in pollution control and abatement activities at all levels will illustrate percentage per annum increases. The following tables depict these projected workforce requirements to 1982.

TABLE XXV

UTAH DEPARTMENT OF NATURAL RESOURCES

Division of Oil & Gas Conservation
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Administrator	1	1	1	1	1	1	0%	0%
Administrative Aide	1	1	1	1	1	1	0%	0%
Petroleum Engineer	1	1	1	1	1	1	1%	1%
Geological Engineer	1	1	1	1	1	1	1%	1%
Biological Engineer	1	1	1	1	1	1	0%	0%
Environmental Engineer	0	0	1	1	1	1	*	20%
Statistician	1	1	1	1	1	1	0%	0%
Hydrologist	0	0	1	1	1	1	*	20%
Secretarial	5	5	5	6	6	6	N/A	4%
TOTAL	11	11	13	14	14	14	N/A	5%

* unavailable

The above table illustrates a 5% per annum overall increase in staff for the entire Division. The Oil & Gas Section is not expected to show staffing increases over the next two to four years. The additional personnel depicted above will be allocated to the Mining Section.

The State Planning Office anticipates that there will be no increase in staff during the next five years. As positions become vacant, it is estimated that Energy Conservationists will be hired as replacements. However, actual percentage increases per annum are not anticipated.

The Utah Interdepartmental Coordinating Council for Energy Affairs anticipates increases in staff but not before July 1977. The following table illustrates anticipated staffing levels to 1982.

TABLE XXVI

UTAH INTERDEPARTMENTAL
COORDINATING COUNCIL FOR ENERGY AFFAIRS

Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
State Energy Coordinator	1	1	1	1	1	1	0%	0%
Data Collector	0	0	0	1	2	2	*	20%
Conservation Specialist	0	0	0	1	2	2	*	20%
Secretarial	0	0	1	1	1	1	N/A	20%
TOTAL	1	1	2	4	6	6	N/A	50%

* unavailable

The above table depicts a 50% per annum increase in staff to 1982 for the Council. However, this is the initial allocation of staff even though it is a process which is anticipated to span several years. After the establishment of a permanent staff, few increases will be anticipated.

Although no firm figures are available, the private sector should experience a five to eight percent per annum increase in energy pollution control and abatement personnel to 1982.

D. Training and Certification

Most of the training relative to this category consists of education of the citizenry regarding conservation practices. Each of these agencies will become more active in the education of the public and other state and local governmental personnel. The Council for Energy Affairs will begin seminars and workshops regarding the State Energy Plan when it is finally completed and legislatively endorsed. Industrial energy conservation will be a major topic.

E. Career Potential

Career opportunities are expected to develop over the next three to five years for degreed and highly trained engineers, scientists, and architects in energy research, product design and development, as well as in the extractive industries. Career opportunities will be available on the technical level to a lesser degree. Utah, indeed, may develop new energy related occupations over the next five years.

F. Conclusion

The federal government controls 66% of the land in Utah. Currently, one of the major problems relative to land use, specifically energy resource extraction, is the classic and typically western clash between the state government and the federal government. The Bureau of Land Management (BLM) controls vast quantities of western land and conflicts rage between the developers and the nondevelopers.

As previously mentioned, Utah is slated for a variety of energy development projects over the next five years. The State of Utah places special emphasis on the protection of their environment. However, the stringency of environmental controls, according to some state personnel, continue to stifle energy resource development.

Although energy development is discussed from various points of view in Utah, the workforce allocated to energy pollution control and abatement will steadily increase over the next few years.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

The signing of the Morrill Land Grant Act by President Abraham Lincoln in 1862 granted the authority for the establishment of land grant colleges across the country. Utah spent the next few years introducing and passing bills which would establish an agricultural college. A site was chosen in the Cache Valley and in 1890 the Utah State University (then called the Utah Agricultural College) opened its doors in Logan to the first student - a woman. By the end of the first year, the enrollment was 139. Today, Utah State University has an approximate enrollment of 9,000 students. The University consists of 46 departments in light academic colleges and a school of graduate studies. Today the majority of the environmental/energy programs currently being conducted in Utah are located at Utah State University at Logan.

The College of Engineering presently includes a program in civil and environmental engineering which leads to a Bachelor's of Science degree. The environmental engineering curriculum is interdepartmental and is basically a graduate program which offers the degrees of M.S. and Ph.D. The environmental student is encouraged to begin early and thereby facilitates the completion of many prerequisites which are normally omitted in the undergraduate engineering program. The first two years of this program are composed of a common core curriculum.

The Utah State University has established the Utah Water Research Laboratory. Research is conducted which includes all areas of water resources, water quality and weather modification. The Laboratory

is operated in cooperation with the Departments of Civil and Environmental Engineering, Agricultural and Irrigation Engineering, and related departments in other colleges.

The USU College of Natural Resources administers an environmental studies program which leads to a B.S. degree. This program utilizes resources from across the university and is a broad-based curriculum with a considerable degree of flexibility. Four parts compose the general curriculum: (1) 35-40 credits in courses which emphasize analyzing and evaluating environmental issues and alternative approaches to environmental problem solving (required core); (2) at least 30 credits in an approved area of emphasis; (3) a student project 3-15 credits (optional); and, (4) electives.

The USU College of Science, Department of Biology offers a B.S. degree in Public Health with an environmental health option. A B.S. degree in Applied Biology is available with the program emphasis on pest management.

The following pages detail some of the environmentally related programs currently available at Utah State University. The information was gathered by means of telephone interview and catalogue review.

SENIOR INSTITUTIONS

Utah State University
Logan, Utah

Program: Environmental Studies (B.S.)

Hours required for major: Quarter - 60
Program Inception: 1973
Staff Size: unavailable
Enrollment: unavailable
Graduates (1976): 14
Placement: unavailable
Graduate Work: unavailable

Courses

Applied Environmental Problem Analysis
Evolution, Ecology and Man
Quantitative Analysis for Natural Resource Management
Principles of Natural Resource Management
Human Population and Related Social Issues
Population and Resource Perspective
Human Ethics and Values
Literature
Environmental Economics
Microeconomics
Introduction to Forest Resource Economics
Range Resource Economics
Principles of the Political Process
Organization and Management of Public Administrative Agencies
Political Economy of Environmental Quality
Principles of Natural Resource Policy
Environmental Law

Program: Civil and Environmental Engineering (B.S.)

Hours required for major: Quarter - Major 60, Minor 18
Program Inception: unavailable
Staff Size: Four professors, four associate professors, one assistant professor (9 Ph.D.)
Enrollment: unavailable
Graduates (1976): 35
Placement: unavailable
Graduate Work: 5

Courses

Plane Surveying
Surveying

Structural Mechanics-Determinate
Structural Design
Photogrammetry
Engineering Materials
Water Resources Engineering-Hyrdology
Fluid Mechanics
Water Resource Engineering-Hydraulics
Resource Utilization and Environmental Management
Environmental Engineering-Aquatic Systems
Environmental Engineering I and II
Structural Mechanics - Hyperstatic
Structural Concrete Design
Structural Steel Design
Engineering Economics
Legal Aspects of Engineering
Soil Mechanics
Senior Seminar
Independent Study
Honors Studies
Construction Cost Estimating
Prestressed Concrete Design
Mechanical Vibrations
Mechanics of Solids
Limit Analysis of Structures
Structural Synthesis and Design
Computer Structural Analysis
Highway Engineer
Traffic Engineering
Soils Engineering
Foundation Analysis and Design
Water Project Design
Applied Hydraulics
Hydraulic Transients
Fluid Mechancis and Hydraulics
Aquatic Microbiology
Water Quality Analysis
Chemistry of Aquatic Systems
Design of Municipal Water and Wastewater Systems
Water Systems Analysis and Planning
Water Quality Modeling for Environmental Management
Watershed Hydrologic Modeling

Program: Environmental Engineering (M.S., Ph.D.)

Hours required for major: Quarter - (M.S.) 45, (Ph.D.) not available
Program Inception: 1966
Staff Size: Two professors, three associate professors, one assistant professor, and two research assistant professors (7 Ph.D.'s, 1 M.S.)

Enrollment: 3
Graduates (1976): 10
Placement: unavailable
Graduate Work: unavailable

Courses

Structural Matrix Analysis
Mechanical Vibrations
Continunuum Mechanics
Elastic Theory
Elastic Stability
Similitude
Highway Planning and Economics
Concrete Engineering
Earth and Rock Fill Dams
Soil Mechanics
Soil Mechanics Laboratory
Transport Phenomena
Hydrologic Methods
Groundwater Hydrology
Snow Pack Management
Hydraulic Design
Fluid Mecahnics Instrumentation
Open Channel Flow
Sediment Transport
Fluid Mechanics
Water and Wastewater Treatment
Industrial Wastewaters
Engineering Systems: Optimization
Graduate Seminar
Directed Reading
Special Problems
Thesis Research
Continuing Graduate Advisement
Elastic Theory
Plate Theory
Shell Theory
Water Resources Engineering Systems
Water Resources Engineering Institutions
Water Resources Engineering Planning
Porous Media Flow
Numerical Methods in Engineering
Potential Fluid Flow
Free Surface Hydrodynamics
Boundary Layers and Turbulence Theory
Water Quality Management
Waste Management

Program: Applied Biology, Pest Management (B.S., M.S., Ph.D.)

Hours required for major: Quarter - Major 108, Minor 20
Program Inception: 1976
Staff Size: Two professors and one associate professor (3 Ph.D.)
Enrollment: 8
Graduates (1976): 1
Placement: 0
Graduate Work (M.S.): 1

Courses (Selected)

Biology
Ecology
Genetics
Toxonomy
Plant Pathology
Chemistry
Entomology
Mathematics
Physics
Forest Science
Plant Science
Soil Science

Program: Public Health with Environmental Health Option (B.S.)

Hours required for major: Quarter - Major 186, Minor 18
Program Inception: 1960
Staff Size: Two associate professors, two assistant professors
(3 Ph.D.'s, 1 M.S.)
Enrollment: 20
Graduates (1976): 1
Placement: 1
Graduate Work: unavailable

Courses

General Biology
Chemical Principles and Qualitative Analysis
General Physics
Mathematics
Fundamentals of Epidemiology
Environmental Health
Special Problems in Public Health
Introduction to Public Administration
Basic Statistics
General Microbiology
Food Microbiology

Aquatic Microbiology
General Ecology
Resource Utilization and Environmental Management
Technical Writing
Medical Entomology
Laboratory and Field Methods
Fresh-water Algae
Water Quality Management
Air Quality Management
Waste Management
Industrial Hygiene
Parasitology

State Legislation

UTAH AIR

TITLE:

Air Conservation Act
Utah Code 26-24

PURPOSE:

To provide for a coordinated statewide program of air pollution prevention, abatement, and control, and to protect the air quality of the state.

DEFINITIONS:

1. Air contaminant
2. Air contaminant source
3. Air pollution
4. Ambient air
5. Person
6. Facility
7. Indirect source
8. Board
9. Division
10. Director
11. Committee
12. Executive secretary

ADMINISTERING AUTHORITY:

Division of Health
Air Conservation Committee

AUTHORIZATIONS:

To act as the state lead agency in air pollution matters;
To issue regulations relating to air pollution control;
To establish air quality standards;
To develop a comprehensive state air pollution control plan;
To conduct studies and investigations;
To monitor air quality in the state;

AUTHORIZATIONS (Cont'd):

To approve new air pollution sources;
To grant variances under the act;
To administer and enforce the act.

PROHIBITED ACTS:

To fail to obtain required construction approval;
To discharge air contaminants in violation of air quality standards;
To violate any act provisions or regulations.

EXEMPTIONS:

Burning of trees and branches in connection with agriculture, burning of weed growth for irrigation, emissions from orchard heating devices do not constitute violations.

PENALTIES:

General violation - fines of up to $10,000 per day.

UTAH PESTICIDES

TITLE:

Economic Poison Application Act of 1951
Utah Code 4-4-14

PURPOSE:

To provide for the control of pesticide use through a pesticide applicator certification program.

DEFINITIONS:

1. Aircraft
2. Commissioner
3. Custom applicator
4. Economic poison
5. Fungi
6. Ground equipment
7. Insect
8. Person
9. Pest control operator
10. Weed

ADMINISTERING AUTHORITY:

Department of Agriculture

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To control pesticide usage;
To enter and inspect property in enforcement of the act;
To establish certification standards and certify commercial applicators;
To develop a state pesticide use plan.

CERTIFICATION OR LICENSING:

Pesticide applicators for hire must be certified through written examination;
Categories are custom applicator and pest control operator.

PROHIBITED ACTS:

To engage in application of pesticides for hire without license;
To violate other act provisions.

EXEMPTIONS:

Non-commercial applicators and commercial applicators earning less than $50 per year.

PENALTIES:

First offense - fines of up to $50;
Subsequent offenses - fines of up to $500.

UTAH RADIATION

TITLE:

Radiation Protection Act
Utah Code 26-25-1

PURPOSE:

To provide a program of protection and control of ionizing sources of radiation.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Board of Health

AUTHORIZATIONS:

To require the registration of sources of ionizing radiation;
To issue regulations for radiation control;
To enter into agreements with other state and federal agencies;
To enforce the act and regulations.

NRC AGREEMENT STATE: No

UTAH SOLID WASTE

TITLE:

Junkyard Control Act
Utah Code 27-12-137.1

PURPOSE:

To regulate junkyards in areas adjacent to interstate and primary highways to enhance the scenic beauty of the state.

DEFINITIONS:

1. Junk
2. Junkyard
3. Automobile graveyard
4. Interstate system
5. Primary system
6. Commission

ADMINISTERING AUTHORITY:

State Road Commission

AUTHORIZATIONS:

To issue licenses for junkyards within 1,000 feet of interstate or primary highways;
To regulate screening and other requirements for junkyards near highways;
To issue regulations pursuant to the act;
To acquire and relocate certain junkyards.

PROHIBITED ACTS:

To maintain a junkyard with 1,000 feet of interstate or primary highway without a license;
To violate other act provisions or regulations.

PENALTIES:

Violation constitutes a misdemeanor.

UTAH WASTE WATER

TITLE:

Water Pollution Control Act
Utah Code 73-14-1

PURPOSE:

To protect and conserve the quality of the waters of the state for beneficial uses, and to control and abate water pollution.

DEFINITIONS:

1. Pollution
2. Wastes
3. Sewerage system
4. Treatment works
5. Disposal system
6. Waters of the state
7. Person

ADMINISTERING AUTHORITY:

Division of Health
Committee on Water Pollution

AUTHORIZATIONS:

To develop water pollution control programs;
To administer water pollution grant programs;
To conduct studies and investigations relating to water pollution;
To adopt water quality standards;
To issue pollution abatement orders;
To act as the state lead agency in water pollution matters.

PROHIBITED ACTS:

To cause any form of water pollution;
To fail to obtain a permit for treatment works construction or alteration;
To violate any other act provisions.

PENALTIES:

Violation constitutes misdemeanor.